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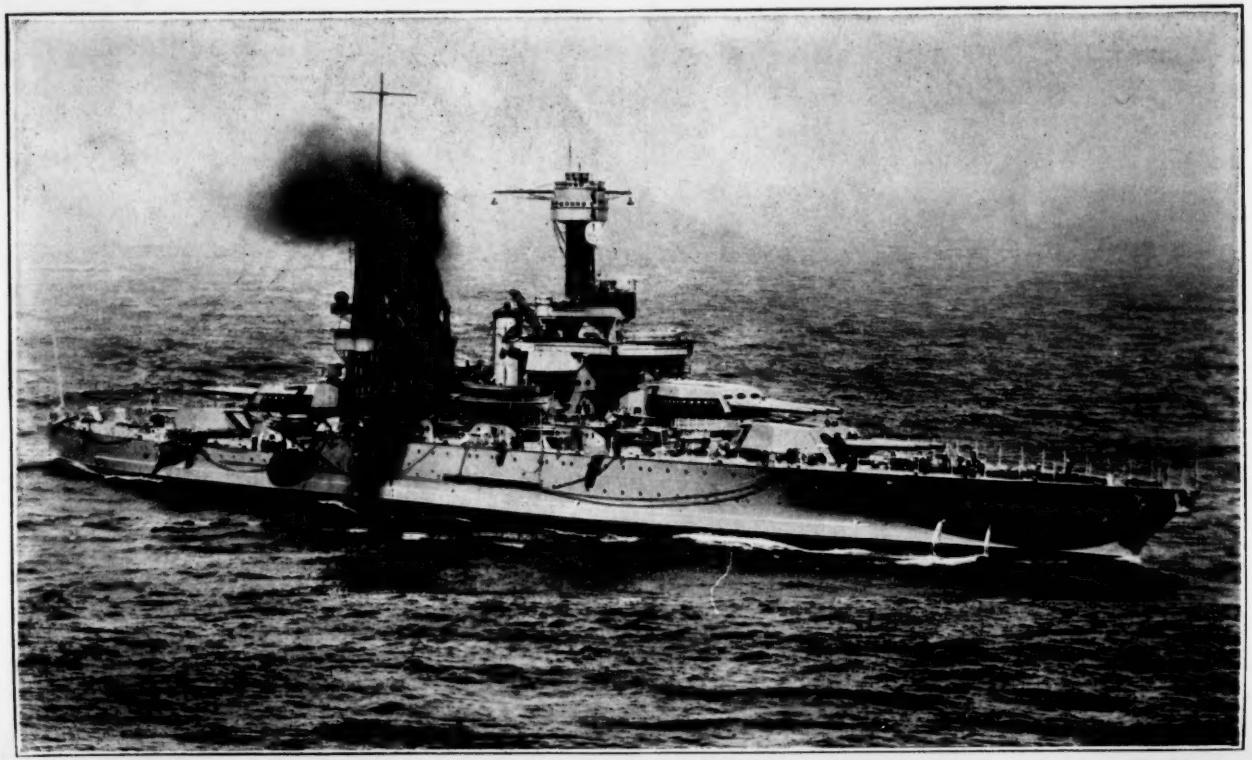

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Winner of the Battle Efficiency Pennant, Battleship Class

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UNITED STATES
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VOL. NO. 50, NO. 11 NOVEMBER, 1924 WHOLE NO. 261

SOME REFLECTIONS UPON COMMISSIONED NAVAL PERSONNEL PROBLEMS

BY D. W. TAYLOR, REAR ADMIRAL (CC) U. S. N., RETIRED

THE personnel problems of officers of the Navy are hardy perennials and crop up every year. As a rule their solution requires legislation and the last two years have been rather barren in this respect. In 1922 the personnel energies of the Navy were devoted to consideration of line and staff amalgamation but affairs did not reach the stage of a bill. In 1923-24, a great deal of energy was expended upon the bill for the equalization of line and staff promotion. Results so far have been negative. It is my purpose, however, to discuss mainly some problems which, if not yet acute, must be faced sooner or later. The sooner naval opinion arrives at conclusions upon them that are legislatively practicable, the better the chance of legislation in accordance with naval opinion.

Perhaps I should apologize in advance for discussing the whole commissioned personnel but about ten years ago I was so unfortunate, as representative of all the staff corps, on a board of three headed by the then assistant secretary, F. D. Roosevelt, as to have to deal with the whole commissioned personnel, the other member being the chief of the Bureau of Navigation, Admiral Blue.

The F. D. Roosevelt board studied its subject for the better part of two years and made two complete reports. Neither met with the approval of the then Secretary of the Navy, or, so far as I am aware, of any ponderable portion of the officers of the Navy. In order to make it unanimous, I think it may safely be

said that no member of the board was fully satisfied with either report.

A fundamental condition existing is that when we come to consider personnel matters we find three distinct sets of interests.

First, there are the interests of the Navy taken as a whole.

Second, there are the interests of the individual officers.

Third, there are the interests of the U. S. Treasury.

If there has been some personnel proposition concerning which these three sets of interests were all arrayed upon the same side I never heard of it and I never expect to hear of one.

It may, at first sight, seem wrong to class interests of individual officers as separate from those of the Navy as a whole, but man is a selfish animal. There may be a few spartans who, when a personnel proposition is first sprung upon them, calculate first its effect upon the Navy as a whole and second its effect upon them individually, but I do not number them among my acquaintances. I am afraid we generally calculate first its effect upon us and, if favorable, there is a very strong temptation to regard it as good for the Navy, and vice versa. Such is fallible human nature.

If we admit frankly that personnel propositions do involve consideration from three points of view, the next step is to point out that the chance of any proposition materializing into actuality depends almost entirely upon its relative effect upon the three interests. Suppose we make the impossible assumption that we can guage accurately in advance the effect of a proposition upon the three interests. Suppose proposition A would improve the Navy one per cent, prejudice officers of the Navy ten per cent and the treasury ten per cent. It would have a slim chance. On the other hand suppose proposition B would improve the Navy ten per cent, prejudice the officers two per cent and the treasury three per cent. If handled with judgment it would have an excellent chance. When I speak of "chance" I refer mainly to chance of legislative enactment, but, as a rule, an essential preliminary is recommendation by the Secretary.

I believe that no one can study the question with an open mind without becoming convinced that the interests of the Navy will not permit every officer who lives and remains in the service to pass through every grade. It is essential to efficiency, particularly in the line, that we should have officers in the upper grades with

experience of the duties of those grades—trained for war, in other words. If every one passes through all the grades, the numbers in the grades being properly fixed, we shall have the condition of a number of years back, where an officer might be promoted to rear admiral one day and retired the next and the only flag officers who had real experience of command afloat were those who happened to enter the Naval Academy very young. Of course by making the numbers in the upper grades large enough, promotion can be had at an earlier age, but if we have four or five officers to do the work of one they cannot all get necessary experience in their legitimate duties and the interests of the treasury will sooner or later put an end to any such situation.

Assume, then, that we are limited in the upper grades to only a modest surplus (one that can be argued no surplus) over the numbers really needed for the legitimate duties of those grades and that officers reach those grades at suitable ages. The situation, as regards individual officers, depends upon how far and in what direction the actual list departs from a normal list. By a normal list I refer to the imaginary condition where numbers are fixed and conditions stabilized, the same number of people being fed in at the bottom every year and the distribution of age through the grades remaining constant from year to year. The navy list is not normal, and probably never will be, and it is interesting to note that, so far, since the World War we are repeating the cycle that followed the Civil War. At the end of the Civil War the United States had the largest Navy in the world. Promotion was good for some years. Large Naval Academy classes were graduated and fed into the service, but Congress authorized no new ships, and naval material dwindled rapidly. In a comparatively short time commissioned personnel became topheavy and in 1882, upon the recommendation of Secretary Chandler, Congress made drastic reductions in personnel. In the line there was but one promotion for every two vacancies. Only enough Naval Academy graduates (but not less than ten) were commissioned each year to fill the vacancies in the grade of ensign. In the staff corps there were no appointments at all until the numbers were reduced. The present stagnation in the supply corps is due to the Act of August 5, 1882. Rear Admiral Carpenter, who retired May 18, 1924, was the last appointment to the then pay corps prior to that act. The next retirement by

the 1924 *Navy Register* will be that of Admiral Jewett, who was appointed March 22, 1892. This ten-year gap in appointments rendered it inevitable that officers appointed immediately after it would reach the top of the list some ten years sooner than otherwise, and would block the list for some ten years. That fact has been obvious for more than thirty years. The supply corps list has been abnormal for that length of time. The line list has been abnormal for more than forty years. With the drastic reduction of 1882 the few Naval Academy graduates who were commissioned for the next ten years suffered stagnation which it is difficult for young officers of the present day to realize. Graduates were then commissioned ensigns after six years—four at the Naval Academy and two at sea. If I am not mistaken, few graduates between 1882 and 1887 served less than ten years as ensigns, and something like thirteen years—fifteen years from the Naval Academy—was the record. The current *Navy Register* shows the class of 1909 to be lieutenant commanders.

The case of these graduates of the '80's of the last century was made much harder and the interests of the Navy suffered severely because, for a number of years after the Civil War, entirely too many men were graduated and commissioned, forming the historic "hump." This could have been easily avoided by a little intelligent foresight on the part of the authorities of the day.

After the Act of August 5, 1882, the navy list was abnormal in that so few people were being fed in at the bottom. The Spanish War and the steady increase in navy material and personnel which set in soon afterward brought it about that the abnormally few people fed in forty years ago, in spite of their cruel stagnation as ensigns, reached the upper grades, broadly speaking, at ages permitting them to pass through with very little elimination. The pendulum is now starting to swing the other way. For some years a larger and larger proportion cannot pass all the grades and when in time the new "hump" reaches the upper grades excessive elimination will be necessary. We will again be where we were some twenty-odd years ago.

While there seems little chance at present that Congress will go as far in neglect of the Navy as it did after the Civil War, there is an appreciable chance that the Navy will suffer even more by Congressional and Executive *activity*. The limitation of arma-

ments conference has already given us one drastic material reduction. Another one like it, and the Navy personnel would inevitably have to repeat the cycle beginning in 1882.

Apart from that chance, however, it is necessary to face the fact that no further expansion of the Navy is in sight, and that being the case, for years to come there will be a steadily increasing proportion of the various Naval Academy classes who cannot be passed through all grades.

Will our present system stand the strain? In my opinion it will not, and the Navy should look ahead and improve it now. It is much easier to avoid a wreck than to salve one.

Fully convinced that the interests of the Navy require that we should *not* pass all officers through the upper grades, I am also convinced that there is no better way of determining those that should pass up than selection up. Theoretically, there is little difference between selection up and selection out, but under existing conditions there is a very serious, practical difference. Human nature being what it is, individual officers plucked in selection out, or passed over in selection up, will appeal to friends in Congress. When "A" is plucked he tells his congressional friend, with truth, that his record is good, proves he is a competent and experienced officer, and, convinced of this, his congressional friend is almost certain to press his case. It was this kind of thing, together with allegations of favoritism and enmity on the part of the plucking board, that killed the selection out scheme of the personnel act of 1899.

Under selection up, however, when "A" is passed over he must convince his congressional friend that he is a better man than all of the people selected up. This is a much more difficult thing, and not nearly so many officers will succeed. Even so, there will be plenty who will succeed.

When we consider methods of selection up there are two difficulties with the present system that will weaken it more and more as time goes on.

Selection by a board of limited numbers will arouse more and more opposition. Sooner or later accusations of favoritism will be freely made and believed. It is unfortunate in one way that, so far, promotion has been so good that it has been possible to promote nearly everyone. Under these conditions it is natural

that apparently the majority of many boards have considered that the interests of the Navy were furthered by the selection of seniors. The selection board oath requires each member to swear or affirm: "That he will, without prejudice or partiality, and having in view solely the special fitness of officers and the efficiency of the naval service, perform the duties imposed upon him."

A slight change in this oath—the insertion of the words "without regard to seniority" would insure carrying out the intent of the present law. However, without any change in the law, the question of seniority will probably take care of itself when the percentage of people promoted is reduced, as it will be in a few years.

The alternative to selection by a board is selection by some system of voting. This is an attractive idea and has the great practical advantage that it should reduce to a minimum charges of favoritism. Diffusion of responsibility obtained by such a system would be very desirable, but the mechanics, so to speak, would be difficult. If some method could be devised by which each candidate's complete record could be furnished each senior officer, who would make selections without consultation, the voting system would undoubtedly be superior to a board.

The difficulty of furnishing the record and the time senior officers would have to give to this selection work seem the principal objections to the voting method or the all hands selection board, it might be called. This brings me to the principal defect of the present system. In a small corps a selection board will have sufficient personal acquaintance with candidates to be able to act intelligently, but the line and some staff corps are now so large that this is hardly possible. The tendency will be more and more to rely upon the record and the records should be such as to enable any capable board to grade officers from them. Perhaps this is a counsel of perfection, but there is no more important job in the Navy today than that of improving matters along this line. Not only is the present fitness report unsatisfactory in form, but, apart from the unavoidably different characteristics of marking officers, there is great need of indoctrination of uniformity of basis of marking. Some years ago, when numerical marks were assigned, there was a Chief of Bureau in the Navy Department whose policy was never to give an assistant a 4.0 unless he regarded him

as 100 per cent perfect. At the same time there was another Chief of Bureau whose policy was to mark every assistant 4.0 unless he had made some bad *faux pas* during the period covered. Obviously, such basic differences in ideas should not exist. It is, of course, a difficult thing to secure uniformity of ideas in such a matter, and it is really a question of education, as it were, but perhaps, if fitness reports contained a statement as to the proper basis for marking and the marking officer were required to certify that he had used that basis, it might help. This is virtually done in Army efficiency reports.

The present form of Report of Fitness is, I believe, the fourth that I have been acquainted with, and from my experience as a marking officer and member of selection boards, it is, I believe, in some respects the most difficult to fill out satisfactorily and to evaluate after it is filled out.

The part dealing with "Professional Qualifications" is, at least, easy to fill out, but the work of the Navy is not yet sufficiently standardized to allow all jobs to be characterized by two words.

For many years fitness reports answered, in substance, three questions. What was his job? How well did he understand his job? How well did he do his job? Now we have condensed the last two into one—or rather dropped the second question—but the present form leaves something to be desired as regards answering the first, and it is very doubtful whether the second should be dropped.

When we come to that part of the report dealing with the somewhat elusive question of personality the present fitness report falls down badly. Nineteen qualifications are enumerated, some minor, some major, none defined, all to be marked either "Superior," "Above Average," "Average," "Below Average," or "Inferior." Why mark on a scale of 4 in part of the form and use words here? For detailed comparison we must, in the end, range people in order, which means to mark them virtually if not actually.

What proportion of superior officers can possibly mark more than a small fraction of their subordinates from personal knowledge as regards all nineteen of the qualities, and how can anyone evaluate numerically a candidate's standing from a set of marks on nineteen qualities—some major, some minor? Of course the prob-

lem of defining personality is a very difficult one, but it is not peculiar to the Navy.

The qualifications enumerated in the navy form are quoted below:

1. Aptitude for the service. 2. Conduct. 3. Cooperative qualities. 4. Courtesy. 5. Devotion to duty. 6. Education. 7. Force. 8. Industry. 9. Initiative. 10. Judgment. 11. Justice. 12. Leadership. 13. Military manner and bearing. 14. Neatness of person and dress. 15. Patience. 16. Physical energy and endurance. (In accordance with reporting officer's personal opinion, without reference to medical officer.) 17. Reliability. 18. Self-control. 19. Subordination.

Perhaps I should mention that in another part of the form the marking officer is required to mark the subject "when appropriate" upon a scale of 4, as "Executive officer or executive ability." Also upon "Seamanship." It would rather seem that executive ability should be classed with the nineteen qualifications above.

The Army meets the same problem in its Efficiency Report by marks under ten heads only. It also defines or explains briefly the qualities and defines "Inferior," "Superior," etc. The pertinent part of the army form is quoted below:

H. "1. Physical activity (agility; ability to work rapidly). 2. Physical endurance (capacity for prolonged exertion). 3. Military bearing and neatness (dignity of demeanor; neat and smart appearance). 4. Attention to duty (the trait of working thoroughly and conscientiously). 5. Tact (the faculty of being considerate and sensible in dealing with others). 6. Initiative (the trait of beginning needed work or taking appropriate action on his own responsibility in absence of orders). 7. Intelligence (the ability to understand readily new ideas or instructions). 8. Force (the faculty of carrying out with energy and resolution that which, on examination, is believed reasonable, right, or duty). 9. Judgment and commonsense (the ability to think clearly and arrive at logical conclusions). 10. Leadership (capacity to direct, control, and influence others in definite lines of action or movement)."

D. "CONSIDER CAREFULLY THESE DEFINITIONS, KEEP THEM IN MIND WHEN RATING, AND COMPARE THE OFFICER WITH OTHERS IN THE SAME GRADE.

INFERIOR: *Exceptionally poor* performance of duty; *exceptionally lacking* in qualification considered.

BELOW AVERAGE: Duty *not* performed *as well as should reasonably be expected* under circumstances; not *entirely* satisfactory.

AVERAGE: *Efficient;* duty *well* performed; *up to standard;* qualification *satisfactory.*

ABOVE AVERAGE: Duty performed *markedly better than could reasonably be expected* under the circumstances; qualified to *marked* degree.

SUPERIOR: *Very exceptionally efficient* performance of duty; qualified to a *very exceptional* degree."

Certainly the army definition of "Average" will be helpful to a marking officer.

The same personality problem occurs in civil life. The newspaper item quoted below gives an account of its attempted solution at the University of California.

PERSONALITY IS RATED

University of California Regards It as Vital as Good Grades. *Berkeley, Cal.*, June 7.—Personality records of graduates in engineering, declared equally or more valuable than scholastic achievements, are now kept by the University of California and are made available for manufacturers and other employers of young engineers.

All juniors and seniors are rated both by members of the faculty and by their fellow students as to character, address, appearance, leadership, disposition, popularity, speed in work, accuracy and attention to detail. A student committee is asked each year to rate the members of its class. These ratings are compared with those of the faculty and an average is thus struck. The students' rating has the weight of one instructor's rating, and, according to the university authorities, it has been found that the students are more strict than the teachers.

Professor Blake E. Vanleer, in discussing the system, points out that employers do not select college graduates primarily because of their scholastic grading, but put a high value on personal recommendation.

The personality records are permanent, so that, with the passing years, the graduate is protected against the death or resignation of the professors who knew him best.

Professor Vanleer reports that personnel officers from large corporations come regularly to the College of Mechanics to study the data of those about to be graduated and to check the records by their own observation of candidates for employment.

It is explained that a man need not rate high in every particular to be acceptable. If, for instance, he is rated relatively low in precision and detail, he may stand high enough in other respects to make an excellent salesman or executive; while for research or technological work, diffidence is no bar, though accuracy is necessary.

Here we have only nine qualities enumerated: Only two of them, leadership and appearance, are found in both the navy and army lists.

The statement that various characteristics are suited to various jobs reminds me of one serious difficulty with navy selection as regards the line. There are a number of line specialties essential to the work of the Navy and it is obviously difficult for any selection board or other method of selection to do even-handed justice

to the various specialists. This matter will become more acute as promotions dwindle in the future. If the line and staff amalgamation proposed two years ago had gone through, the situation would have been much worse, and it seems quite probable that in years to come this question of promotion may force segregation into more corps rather than amalgamation.

It is quite evident that the Navy, the Army, and the University of California have the same end in mind yet their solutions are very different. For instance, the navy lists "cooperative qualities." The nearest approach to this in the army list is "tact" and in the University of California list, "disposition" or, perhaps, "popularity." Now there is no doubt that the ability to do teamwork is a great asset to a member of any organization and no list of personal characteristics should omit it. On the other hand the navy list, apart from its great length, appears subject to a great many criticisms. For instance, take "Aptitude for the service." Does not this include all the rest? And will not the average senior assigning marks sum up in his mark for aptitude his average of all the characteristics of the subordinate? If this is the case, aptitude should be segregated from the other eighteen.

Take "Self-control." Does this refer to control of temper or something else? There is much chance for misunderstanding here.

What has gone before is subject to the just criticism that it is mostly fault finding and not suggestions for improvement. I will endeavor to suggest a few improvements which will all be subject to criticism but I may point out as one possible mitigant of criticism that they are intended for the U. S. Navy as is and not for the Navy of Utopia.

In the first place all statements of senior officers should, if possible, be made as marks upon a scale of 4. If they are to be used to compare one officer with another some one must at some time evaluate them on a basis of marking and the person who originally makes the statement is in the best position to do this.

In the second place fitness reports to be used by selection boards should contain only matter of use to the board. Desires for duty, information as to the address of next of kin, and other matter of use only to the Bureau of Navigation should be eliminated.

The form should be such as to enable anyone of ordinary in-

telligence to ascertain the reporting officer's conclusion as to the proper replies to the following four questions:

1. What was his job (or jobs) during the period reported on?
2. How well did he understand his job (theory or experience)?
3. How well did he do his job (practical ability, industry, etc.)?
4. What are his personal characteristics?

Of course No. 4 is the difficult one; not only difficult for the marking officer but difficult for the selection board. The present form not only enumerates nineteen headings of personal characteristics but requires the marking officer under "Remarks" to "give a general outline of this officer's character."

It would seem advisable under 2 and 3 to amplify the marks given by specific remarks and explanations in each case. When it comes to 4, characteristics should not be arranged alphabetically and indiscriminately but grouped (and preferably arranged in order of importance in each group) into what I may call positive and negative characteristics.

Positive characteristics would be those such as leadership, and ability to do teamwork, whose presence up to 4 add always to an officer's value. Negative characteristics would be those such as education, courtesy, self-control, as to which an officer should be satisfactory but as to which a mark of 3.2 is virtually as good as a mark of 4. The list of positive characteristics should be so short that anyone using the report should be able to condense all marks upon them into a single mark, using his own ideas of their relative importance and of the bearing of the marks under the negative group, which may be as long as you like.

It may seem that the suggestions above tend to reduce a selection board to clerical functions only. It is true that they depart in this direction from the present system, but we might as well face the fact that selection by a board of naval officers will not continue unless Congress is convinced that it is made upon the basis of, and can be justified by, the written record. The present law of 1916 is exceedingly liberal in this respect. The Army Act of 1920 is much less so and any future legislation for the Navy will undeniably be more restrictive than the present law for the Navy.

It may be of interest to quote here a portion of the Army Act of 1920:

"24b. CLASSIFICATION OF OFFICERS.—Immediately upon the

passage of this Act, and in September of 1921 and every year thereafter, the President shall convene a board of not less than five general officers, which shall arrange all officers in two classes; namely, Class A, consisting of officers who should be retained in the service, and Class B, of officers who should not be retained in the service. Until otherwise finally classified, all officers shall be regarded as belonging to Class A and shall be promoted according to the provisions of this Act to fill any vacancies which may occur prior to such final classification. No officer shall be finally classified in Class B until he shall have been given an opportunity to appear before a court of inquiry. In such court of inquiry he shall be furnished with a full copy of the official records upon which the proposed classification is based and shall be given an opportunity to present testimony in his own behalf. The record of such court of inquiry shall be forwarded to the final classification board for reconsideration of the case, and after such consideration the finding of said classification board shall be final and not subject to further revision except upon the order of the President. Whenever an officer is placed in Class B, a board of not less than three officers shall be convened to determine whether such classification is due to his neglect, misconduct, or avoidable habits. If the finding is affirmative, he shall be discharged from the Army; if negative, he shall be placed on the unlimited retired list with pay at the rate of two and one half per cent of his active pay multiplied by the number of complete years of commissioned service, or service which under the provisions of this Act is counted as its equivalent, unless his total commissioned service or equivalent service shall be less than ten years, in which case he shall be honorably discharged with one year's pay. The maximum retired pay of an officer, retired under the provisions of this section prior to January 1, 1924, shall be seventy-five per cent of active pay, and of one retired on or after that date, sixty per cent. If an officer is thus retired before the completion of thirty years' commissioned service, he may be employed on such active duty as the Secretary of War considers him capable of performing until he has completed thirty years' commissioned service. The Board convened upon the passage of this Act shall also report the names of those second lieutenants of the Quartermaster Corps who were commissioned under the provisions of section 9 of the Act of June 3, 1916, who are not qualified for further promotion. The officers so reported shall continue in the grade of second lieutenant for the remainder of their service and the others shall be placed upon the promotion list according to their commissioned service, as hereinbefore provided."

Here we have the old navy plucking system with important modifications. Though not specifically required, it is very strongly implied that all action must be based upon official records and no officer can be plucked until a court of inquiry has passed upon his case.

The present army system was very suitable for the conditions

existing in 1920 and has not, on the face of things, the objections that killed the old navy plucking board, but when stagnation of promotion sets in and cannot be avoided except by plucking many meritorious officers it will be under a severe strain and a strain which it was not constructed to meet.

Of course there is one specific advantage of the selection out system—its simplicity. When a man is selected out he is out and that is the end of it. With selection up it is necessary to dispose of those not selected.

Coming now to general questions, it would be very desirable to institute some system of weeding out naval officers in grades below lieutenant commander. This is desirable with a normal list, and the present abnormally large classes in the lower grades render it particularly desirable. Theoretically, this could be accomplished by present examining boards but experience of many years has shown that, human nature being what it is, very few eliminations are made by examining boards. A simple and adequate method of obtaining the desired result would be to retain examining boards for promotion, but promote only a certain percentage from each grade to the next higher, leaving it to the examining board to separate the sheep from the goats. It would seem to be the fairest method to apply percentages to classes inclusive of deaths, resignations and dismissals, both stimulating weak sisters to resign and giving the remaining members of a class the benefit of dismissals.

Considering the upper grades, there is no problem as regards the people selected to go up. The problem that will rapidly grow more and more serious is the disposal of those not selected. There is no doubt that age in grade retirement is the best thing for the Navy. Unfortunately it is against the interests of the individual officers (on the average) and against the interests of the treasury. It always seemed a very surprising thing that Congress was willing to incorporate age in grade retirement when, in 1916, it legislated for promotion by selection in the line. When, in 1917, it extended promotion by selection to the staff there was no provision for age in grade retirement and we have now a double standard.

The so-called "equalization" bill considered by Congress during last session extended age in grade retirement to the staff. Portions of the bill might have had some chance, even if it did read like an appendix to *Alice in Wonderland,* but, according to the

press, neither committee gave any favor to the age in grade retirement feature.

We have had a few age in grade retirements but they have all been virtually cases of selection out. There seems hardly a chance that the present age in grade retirement will survive when we reach a condition where the vast majority of officers will be retired for age in grade.

Too strong a practical case can be made against it and it will be killed by the condition that capable and experienced officers will be forced unwillingly to retire to satisfy the theory that young officers are better for the Navy. Imagine an officer of the rank of captain holding forth as follows to a congressional committee—any committee:

"I am an officer — years old of the rank of captain. I was selected twice for promotion to commander and captain and have a first class record as captain but have not been selected as rear admiral as only one captain in ———— can reach that rank. I am able bodied, thoroughly experienced in and qualified for the duties of my present rank, and could give the Navy — more years of good service, but by the age in grade retirement law am about to be forced unwillingly on the retired list."

Any committee would promptly recommend repeal or modification of the age in grade retirement law. We cannot expect any system to endure under which numbers of able and experienced officers are forced unwillingly to retire under an arbitrary age limit simply to prevent a stagnation that is *in the future.*

The question is, how little can we depart from the present system and still obtain congressional approval?

The system outlined below is suggested as possibly meeting the requirements.

Provide, in a bill of not over two pages:

1. That no officer passed over shall be retired with less than thirty years' service.

2. That when stagnation detrimental to the interests of the Navy exists the President may retire, in order from the top of the ranks of captain, commander and lieutenant commander, officers who have been passed over.

3. That the present stagnation in the medical and supply corps, due to the Act of 1882, be met by the good old expedient, approved

repeatedly in the past, of temporary extra numbers in the upper grades.

The above system would be flexible and could be applied as necessary to meet the individual needs of the line and the various staff corps. In practice, retirements would never be forced unless naval opinion was fully behind them. Unfortunately, there would always be objectionable stagnation, but it is not likely that Congress would approve any system permanently that did not involve sufficient stagnation to be somewhat detrimental to the Navy.

There would still be opposition from individual officers affected, but with existing stagnation demonstrable their case would not be very strong.

Since officers now may retire as a privilege after thirty years, and a right after forty, it would seem only fair that the Navy should have a right to force retirements after thirty years when it benefits thereby.

A very little investigation brings out the striking differences between the Army and the Navy as regards these personnel questions. The differences are more radical than former pay table differences but the benefits of recent cooperation as regards pay tables are so obvious as to suggest the desirability of joint consideration and action as regards what are, after all, very similar personnel problems.

The army "Efficiency Report" seems, on the whole, distinctly superior to the navy "Report on the Fitness of Officers" as a basis for selection for promotion. In conclusion, I venture to repeat my opinion, already expressed, that there is no more important job in the Navy today than that of improving the method of making the record of an officer's fitness as a basis for promotion by selection.

This does not mean improvement of the fitness report only—though that is much needed—but also indoctrination of the officers of the Navy, the majority of whom are, I believe, still opposed to promotion by selection, with the idea that records should be made in such a manner as truly to guage the value of an officer to the Navy, that too high a mark given a subordinate is as much an injustice to the Navy as too low a mark is to the officer.

A SUGGESTION FOR NAVAL RESERVE TRAINING

By Lieutenant Commander E. S. R. Brandt, U. S. Navy

Reason for Having a Naval Reserve.—There is a very serious reason for the existence of a Naval Reserve which should not be lost sight of by either the regular Navy or by the Naval Reserve itself. That reason lies rooted in American policy which assumes that the citizens of the nation are potential fighting men and that the potential military reserve thus existing makes it unnecessary to maintain a large regular Army and Navy. Such policy is sound if the military reserve of the nation is a trained reserve capable of induction into an expanded Army and Navy upon mobilization in a national emergency without disrupting the ability of either to take the field or sea respectively. The memory of frantic war-time efforts to train thousands of reservists intensively is still fresh in the Navy as is the memory of depleted regular naval crews from which hundreds of trained guns' crews were sent to merchant ships while the fleet trained rookies before it dared go to sea. The Naval Reserve exists, presumably, so that the next time the Navy mobilizes for war, the greater part of this necessary training will have already been done. The conviction is growing that training of the Naval Reserve is becoming perfunctory and that the next war will find the Navy without an adequate reserve, though there is no question that there will be thousands of eager and patriotic young men again to offer their untrained services.

It was found that naval reservists could be quickly trained for specific duties and that when kept on these duties they became as proficient as regulars. A notable instance was the efficiency with which the North Sea mine barrage was laid during the summer of 1918. The greater part of the officers and men engaged in this highly technical work were naval reservists who, after as intensive training as any body of men ever had, proceeded to hang up a record for mine laying unapproached by any other navy.

Mobilization Problem of the Naval District.—Our mobilization plans show approximately what personnel we will need and where we will need it, especially in each naval district which is liable to become a focus of confusion on the outbreak of war due to the fact that a district organization is a mere skeleton in peace time and a tremendously expanded administrative establishment in war time. The Navy itself has barely enough officers and men to man and operate the fleet in peace and has no regular personnel to spare for the expansion of the naval districts, which, therefore, must depend on naval reservists almost entirely to fill out war complements. Are the naval reservists being trained so that the naval districts can mobilize efficiently? The answer is, "No." Until the naval districts are mobilized efficiently, the fleet itself will get little effective support. The fleet is helpless without a well organized service of supply and repair. It is evident that an expeditious and efficient mobilization of the naval districts is essential in a national emergency.

One of the first requisites of a mobilization is immediate security. For a naval district this security is obtained by the placing and manning of the district defenses, which includes the mining of defensive areas, the maintenance of swept channels, the patrol of merchant lanes and the establishment of aircraft defenses; also the laying and patrol of submarine nets. The defenses established, the further work of mobilization can proceed. To the naval reserve must fall the work of making the naval districts secure in the shortest possible time. Can anything be more obvious than that the naval reservists should be organized and trained in peace time for this particular duty? Perfunctory general training in seamanship and naval custom will not suffice for much of this highly technical work such as mining, mine sweeping, submarine net work and communications. It takes careful and precise training to work with high explosives and the delicate mechanisms devised to explode them. It takes coordination and much practice properly to lay mines and submarine nets. There is time to get in this training in peace time. There are hundreds of reservists anxious for interesting active duty such as this.

Present Reserve Training.—How are our reservists getting their training? In a very haphazard way if the truth be told. Here and there an eagle boat puts to sea for a fifteen days' cruise.

For several years the destroyers took out batches of reserve officers and a few men. This year a battleship, the *Utah,* made some successful cruises. The designation of ships to make cruises with reserves is a matter of expediency. The cruises are made more for the purpose of qualifying the reserves for their retainer pay than for the serious work of training them for actual war service. Under this system some reservists get excellent training; others do not, depending on the methods used by the commanding officer and the time and instruction he gives to what usually amounts to an added burden, for it must be remembered that, of recent years, the personnel turnover has been so great that it has been all a captain could do to train his own green men to fill the petty officer rates so rapidly vacated by discharges.

On the whole, naval reserve training is not at present as satisfactory either to the Navy or the Naval Reserve as it might be or as it ought to be. *Nor will it be until the reserve receives training for specific duties to which he will be detailed in time of war.* The Naval Reserve is not being trained for a national emergency because, perhaps, the Navy itself is not preparing for one. By the Navy is not meant the fleet so much as the many other units and establishments under the cognizance of the Navy Department, all of which must be coordinated to the end that an efficient fleet should keep the sea. The fleet is kept as ready for war as is practically possible. The rest of the Navy is organized and economized for peace. The fleet holds gunnery exercises, tactical exercises and engineering exercises. What exercises do the shore establishments have? None, except to sit tight and keep within their allotments.

Preparedness for the Naval District.—Let us consider what it is possible for a shore establishment like a naval district to do to increase its state of preparedness more nearly to that customary in the fleet. The personnel of a naval district in peace time is merely a skeleton upon which the Naval Reserve must put flesh. It consists of a commandant, who is also wherever possible a commandant of a navy yard, an assistant commandant, an aide, two or three other officers, including a personnel officer and communication officer, a few clerks, radiomen, a barge crew, etc. Heads of departments in the navy yard are usually considered as district aides and form a sort of staff for the commandant. Naval sta-

tions within the district are usually complete units within themselves. Navy yards and naval stations are already in being and need only additional personnel to get on a war basis. The great majority of the activities of a naval district, however, exist only on paper in peace time. Many new stations and units must be created, manned and put into operation in accordance with the war plans. The Naval Reserve, having been placed under the administration of the naval districts, is the logical source from which to man and operate these units. What better training of value to a naval district than to hold partial mobilizations of its reserve force units and to so detail and train these reserves that the outbreak of war would find most of the defenses of the district automatically manned by people already familiar to some degree with their prospective duties. The hitch in such a plan at present appears to be the necessity of actually giving sea duty when a reserve is called to active duty for training. This is correct for members of the Fleet Reserve who would go directly to the fleet upon mobilization; but there will be in war time a much greater relative expansion of the shore establishments than in the fleet, at least in the first few weeks, for the reason that the Treaty for the Limitations of Armaments has scrapped the greater part of the old reserve fleets which used to lie in ordinary at the navy yards. We have only eighteen battleships now, instead of forty, to man on the outbreak of war.

In a naval district there will be a very large number of desk and station jobs which have to be filled for which sea training is not as essential as actual training for the job itself. Presumably, the Naval Reserve, Class 6, can take care of these. There are also a large number of sea-going jobs in a naval district which must be filled immediately and which have already been referred to. A non-existent operating force must be created and immediately put to work, making the district secure from the sea.

District Operating Force in Time of War.—This district operating force will consist of section bases, patrols, mine and mine sweeping flotillas, harbor and channel guards, station ships, lookout stations, radio stations, salvage section, aviation stations and anti-aircraft defenses besides many other special units. Here are specific duties near home for which to train the reserves, duties which they must inevitably have in time of war. Is there any real

reason why they shouldn't be trained for these specific duties in time of peace, except possibly a lack of policy with regard to mobilization in general and the Naval Reserve in particular?

District Training in Peace Time.—While it is manifestly impossible and uneconomical to maintain in a district enough vessels for a complete mobilization, it should be possible to maintain one or two of each type needed for training. Such vessels would preferably be two mine sweepers, two patrol vessels and a tug and barges necessary for submarine net laying. Some districts are already so provided but the duty required of them is such that they can rarely be spared for additional duty. The Navy could, at very small expense, maintain for the proper training of the Naval Reserve forces these small ships which, being permanently available for this work, would insure continuous and progressive training.

When one discovers how much diversified training could be accomplished under competent supervision with these few ships and a definite policy of training for actual war duties, the value of their services becomes apparent. The following are possible: (1) Mines may be laid from the mine sweepers. On board of them may also be taught the mechanism of the mine anchor and at least the general principle of the firing mechanism, some of the details of which are confidential. (2) Precise navigation, essential to the proper placing of a mine field. (3) Mine sweeping, which requires much practice and the exercise of good seamanship. (4) The establishment of a section base as an exercise. (5) The laying of a section of a submarine net and the control of a net gate. (6) Recovery operations. (7) Signaling, radio and a certain amount of gunnery are also possible.

Organization of District Reserve Forces for Training.—Assuming that the requisite ships are available, the first step in utilizing them is to organize the reserves in the district into units which will operate together as crews of mine sweepers, crews of patrol boats, submarine net layers, mine assembly crews, section base headquarters complements, communication groups and a repair force. At various times, on a schedule prepared and approved by the commandant, these groups will be called to active duty and on these district reserve vessels go about the work for which they are detailed. For example, the complement of one of the section bases

will be called to active duty, also two unit mine sweeper crews, a mine assembly crew, and two patrol boat crews. There will probably be a total of thirty officers and 125 men called for two weeks' active duty for *training,* not for yachting. The cruise gets underway and proceeds to the place where the section base is to be established and there establishes it where it will be shortly inspected by the commandant. While at the base, the mine sweepers will practice laying mines and also mine sweeping and all the other activities incidental to section bases in war time. If the fleet can be detailed on a war problem at this time and in this vicinity, so much the better. If the operating forces from another district can be invited to sneak up some night to lay some enemy mines or to attempt a demonstration off the coast, the real interest and a sense of responsibility will soon be developed. After ten days of real work, the cruise should make some liberty port as a reward for the work done. Several working cruises during the summer like this would insure that at least the active and ambitious members of the Naval Reserve in the district would have received training that would greatly simplify the problem of mobilization for war. It would then be possible for a district to promise a mobilization as soon as material was ready. It would not be necessary to wait on personnel, also.

Instruction and Training Problems.—There is also the problem, of course, of where to get the necessary instructors for such training, especially the highly technical work of mine assembly and mine sweeping, as there are no officers of the regular Navy available in naval districts for this work. Assuming that, with a reasonable start, the reserves can eventually instruct themselves much as the Naval Militia is accustomed to do, is it too much to ask that the Navy Department should detail to the office in the Navy Department having cognizance of naval reserve affairs, a few regular officers and experienced reserve officers who would comprise the field staff of this office and who would report to the commandant of a district, when that district was ready to initiate training along these lines, for the purpose of supervising the first cruise or cruises of this district. As the reserve units gained experience, they could be expected to continue their own training with such visits and inspections from the commandant and the field staff from the Navy Department as was desirable and possible. In

addition to this initial instruction, it might be possible as well as desirable for the mine squadron from the fleet to make occasional visits to the districts for the purpose of taking out reservists on a cruise with the regulars, some on board the regular ships and others on their own reserve ships. As the reserves become expert they might even be included in fleet war games.

A haphazard training on any type of ship which becomes available from year to year does not do much more than familiarize the reserve with the Navy in general and does not train a reserve for any specific duty. Were it possible to say to a reserve officer or man, "You will have such and such a job when the Navy is mobilized for war," and if he were given some training of the character required by this job, *either ashore or afloat,* that reserve would, by having this job continually in mind, think about it and almost unconsciously be in continuous training for it.

Summary of Reasons in Support.—The greatest proportionate expansion in naval personnel will come in the naval districts, and it is believed that naval reserve training should take full account of this.

In each naval district there will be required officers and men, which the fleet can not be expected to furnish, to fill the complement of the shore establishment as well as that of the section bases, the inner and outer patrols, the submarine defenses, nets, etc., and the district mine forces.

The district mine forces will play an important part in the coastal defense and will require a hardy type of seaman with intelligence and technical knowledge. The seamen must be able to keep the sea off stormy coasts, to navigate with the utmost precision, and to handle safely and with technical expertness the most deadly engines of destruction. This work requires the most exact and painstaking training and the highest type of personnel. It is no work for children or rookies from training stations.

If the mine force is to be made ready for immediate work, it is most essential that a high type of man be thoroughly trained beforehand. There is an opportunity for each district to begin the training of such a force. With some help from the fleet, which already possesses a highly trained nucleus of a mine force on each coast, this is quite possible at very little expense.

The Naval Reserve can supply the officers and men who are

more or less familiar with the coast in their own district. The naval district can supply the organization to select reserves for training; the fleet can lend its mine forces for the actual training. The Navy Department can supply permanently two mine sweepers fitted for mine laying in each district for supplementary instruction and training. The district will have a potential mine force.

The mine force in the Atlantic consists at present of a cruiser mine layer, the *Shawmut,* two light mine layers (destroyers) and several sweepers already fitted for mine laying. This force would, of course, be expanded in war time by the addition of more of all three types which are now in reserve. Where would the necessary trained personnel come from?

Now suppose that each district had an organized section of the reserve detailed for mine laying and mine sweeping duties whose headquarters were on permanently detailed mine sweepers attached to the district. At least 300 officers and men could be so detailed in each district. Once a year the fleet mine force visits the district, takes as many of these reserves to sea as possible and gives them a fifteen-day cruise of actual mining experience. On each training cruise, all the district reserve mine sweepers should be present so that pairs of mine sweepers could be formed for that necessary branch of the training. It might be possible to use eagle boats for this, as some queerly assorted types have been paired off as sweepers in the past. Regular mine sweepers would, however, be much the best.

With the training thus obtained in the regular mine force, the work of self training in their own sweepers proceeds with a good start. In the meantime, the district is training a body of officers and men, for which it will have vital need, against the day of mobilization. In addition, a reservoir of trained men becomes available for the fleet which may be supplied from those districts whose geographical situation is strategically such that its operating force personnel can be depleted.

Not the least of the advantages of this suggested method of training is training given for definite duties, such as now only reserve aviators enjoy. Moreover, a spirit of competition when the various "suicide clubs" of the different districts get together on cruises will be invaluable in promoting a reserve *esprit de corps* which is now not particularly apparent.

This same method of training for definite duties with the assistance of the fleet and under the control of district commandants can be extended to the training of other groups for specific duties such as radio, sound apparatus, engineering, aircraft defense, etc. All districts will not have the same problems but they all need a reserve upon which they may depend.

A reservist is valuable not because he is simply in being. He must be competent to take over a job in the regular Navy with the fleet or in the district forces. Give him a chance to attain this competency.

SEAGOING AIRCRAFT

By Lieutenant Commander Sidney Ballou, U.S.N.R.F.

AT THE TIME of the Washington Conference the only aircraft carriers afloat were a few experimental craft converted from other types. Had that gathering been a disarmament conference, as it is so persistently regarded, the simple and logical thing to do would have been to scrap the few carriers already built and forbid more. It was recognized that air warfare is more susceptible of barbarous abuse than submarine warfare, but it was deemed impracticable to limit military aircraft on account of the ready convertibility of commercial aircraft. No one suggested that the same argument did not apply to vessels specially designed to carry this new kind of force to the ends of the earth.

The truth is that while the sea powers which sat at the conference were quite willing to avoid an expensive and perhaps ruinous competition among themselves, they had no idea of surrendering a reasonable amount of power, either present or prospective. Instead of confining the latest offspring of Mars to the land, upon which he was born, they adopted him as their own and added him to the fleet. They allotted a tonnage of 135,000 tons, all prospective, to the powers which stood "five" in the newly established ratio, with the rest following in proportion. They thriftily provided that battle cruisers otherwise scheduled to be scrapped might be converted into the new type, thereby saving time as well as money.

We are, therefore, on the threshold of a new development in warfare, of which strategy, logistics and tactics are alike uncharted. Maneuvers with the converted *Langley* are only model tank experiments compared with the problems which must be worked out when we commission the *Lexington* and the *Saratoga*. So far as any experience goes we do not know what types of aircraft it is best to put aboard our big carriers, how the problems of stowage and handling will work out in practice, at what rate aircraft stowed below can be put into the air from a carrier, what

weather conditions will limit their activities, nor how far nor in what time they can be reassembled and stowed after action. On the important preliminary question as to whether the carriers themselves should be in large or small units we are guided wholly by the fortuitous circumstances that we had building two vessels designed for quite a different purpose, which, considering the present state of the art, is as good reason as any.

On the question of what the aircraft carriers shall carry, however, we are not only free to plan from the ground up but to shift our plans almost up to the eve of battle. A turret of three fourteen-inch guns cannot, both for practical reasons and treaty prohibitions, be changed to one of two-sixteen-inch guns, but the main armament of a carrier can be altered, shifted and improved at will up to the moment the carrier weighs anchor to sail with the fleet. The question of how we shall utilize our limited carrier space is obviously of fundamental importance.

The fact that such space is limited is in itself a governing consideration. Any dream of the carrier replacing the battleship as the main capital ship of the world's navies will have to wait until the far distant expiration of the Washington Treaty. Tactics based on fifteen battleships and five carriers are obviously different from tactics based on fifteen carriers and five battleships. At any meeting of fleets at sea, or at any place outside the radius of action from shore bases, visions of bombing planes swarming like locusts will have to be heavily discounted.[1] Aircraft which can be carried on the treaty fleets are relatively few in number and will be launched singly and unhandily.

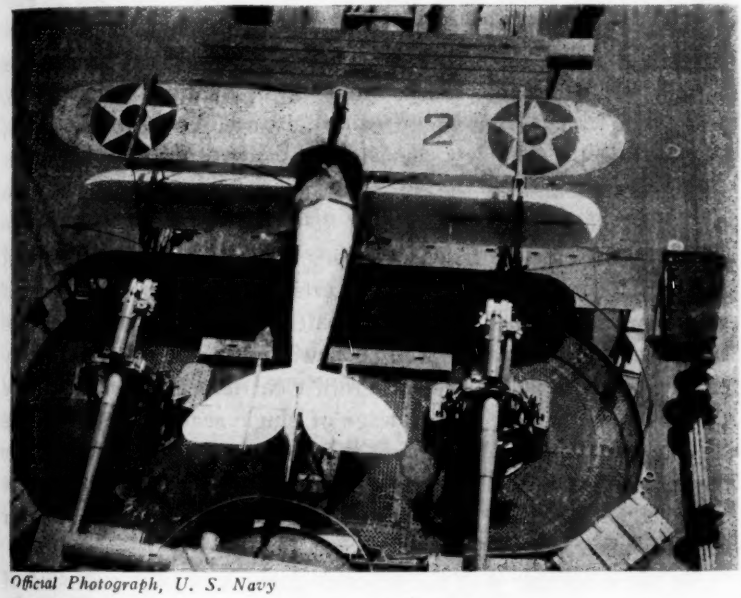
In considering how to arm our carriers it may be assumed that

[1] As an example of current absurdities the following may be quoted:

"Great bewilderment would be imposed upon a fleet of battleship commanders if they were suddenly plunged into a smoke fog while they were steaming in formation, and tons of bombs to begin raining upon them from above—bombs of gas, fire and explosives. Random or fleeting shots from anti-aircraft guns would be of little value. The aircraft, tied to the battleships, could not take off in the smoke with safety."—*Scientific American*, April, 1924.

It is but fair to add that the *Scientific American* afterwards disclaimed the editorial responsibility which accompanied the original publication. Indeed, to impose bewilderment upon a fleet of commanders while tons of bombs begin raining rather suggests a "Japanese schoolboy" origin.

the main purposes of aircraft are combat, scouting, spotting, bombing and torpedoing. It is by no means certain, however, that aircraft designed to accompany the fleet will develop along lines at all parallel with those now existing. Our best scouting planes, for example, are the *F-5-L* and the *N.C.*, but nobody is going to pack an *F-5-L* or an *N.C.* on a carrier. On the contrary, it seems practically certain that even with our big carriers in commission the scouting will continue to be done by planes which can be carried on battleships or scout cruisers and launched from catapults.



Official Photograph, U. S. Navy

"SEAGOING AIRCRAFT"

This brings the combat and scouting types perilously close together and it is a question whether observation planes for spotting will be very much larger. Bombers and their bombs are going to find themselves much reduced when they really go to sea. It is safe to say that no Martin bomber with a two-thousand-pound bomb is going to take off in the length of a flying deck, even of the *Lexington* or *Saratoga*. In brief, the restricted space for stowage, the difficulty of handling and the limited deck for taking off are going to exercise a profound influence in restricting size and modifying the types of seagoing aircraft.

One vital relation, however, would seem to be fixed. Whatever the size and weight of the bomber or torpedo plane, it is always going to be heavier and slower than the combat types. Its chief enemy is and will be the single-seated pursuit plane, which has such superiority of speed and maneuvering power that it is probable that bombers will have to have protecting pursuit planes rather than rely on their own limited powers of defense. Another fairly stable factor is that considering the size of bombers adapted for battleship attack it is probable that at least two pursuit planes can be carried in the same space as one bomber.

It has been generally assumed that in a fleet engagement bombers would figure on both sides. This, however, is by no means certain. In a previous discussion (Naval Institute PROCEEDINGS, July, 1924) the writer ventured to advance the opposite thesis; that is, that the bombing plane is the proper arm only of the inferior fleet, and that the superior naval force should carry no bombers whatever.

To repeat some of the observations then made, a superior naval force carries with it the practical certainty that, pitted against an inferior surface fleet, it will ultimately obtain command of the sea. Needing only assurance that it will not be interfered with by enemy bombers, its restricted aircraft carrier capacity should be devoted principally to the stowage of single seated pursuit planes with the one object of parrying this new form of attack. If the above formula as to stowage space works out in practice, the fleet thus armed will have two smaller and faster fighting planes for every bomber carried by the enemy.

To put it another way the superior fleet needs only command of the air. Such command is primarily the ability to deny the air to the enemy. On land this proved somewhat elusive, owing to the great areas over which armies fought and over which planes operated. At sea there will be two sharp focal points, the carriers from which the planes must start and the adverse fleet which is their objective. Within the limited area thus defined a substantial superiority of combat planes should mean command of the air. Having such command it is not necessary to have air weapons to drive home an offensive through the air. That can be done with the big gun.

With the inferior fleet the converse holds. It is the business of that fleet to take desperate chances in the hope of equalizing

surface fleet strength, and the bombing plane is a legitimate means to this end.

It is easy to define what is meant by "superior" and "inferior" in this connection. It is not wholly a matter of studying tables of naval strength. The superior fleet is one that is going to find the enemy fleet, confident of its ability to defeat that fleet when found. In default of an enemy willing to fight the superior fleet is holding command of the sea and willing to fight for that command when challenged. The inferior fleet is the one driven to fight by the gripping force of sea power—the Spanish at Santiago, the Russians at Tsushima, the Germans at Jutland or at the last great sea battle that was planned but did not come off. These are the fleets that will use bombers, while the fleet confident of its big gun strength should devote every ounce of its aircraft carrying capacity to the combat planes which can best parry this attack.

It may be that special considerations of special missions upon which a fleet may embark may modify this broad generalization. The normal mission of a superior fleet, however, is that above outlined: viz., to find and destroy the enemy fleet or to drive it to hiding, retaining command of the sea. If it is expected to find the enemy fleet near its own base the danger of bombers coming from the shore increases and emphasizes the necessity of defensive pursuit planes.

Too near an enemy base, no fleet will venture. Torpedo boats and submarines have already driven blockading fleets to a respectful distance, and it may be that bombers from shore bases will drive the main fighting force back another step, but the introduction of wireless has made elastic blockades as efficacious as those of the Civil War type which they superseded.

Returning to the main thesis of seagoing aircraft as affecting fleet actions at sea, we may check up the suggestion above advanced by some consideration of probable tactics after contact has been established.

The aircraft carrier has two characteristics that must be taken into account in considering tactical questions. The first is the vulnerability of her flying deck to light bombs, such as can be carried by the faster types of planes. A couple of fifty-pound bombs, for example, might easily muss things up on this exposed platform so that planes could not take off. The advisability of thus equipping the planes of scout cruisers with light bombs, for

the sole purpose of discouraging the use of carriers as scouts, is worthy of some consideration.

The second is the length of time that it is going to take for the carrier to get into action, that is to get her brood into the air. Service experience is yet confined to small planes on a small carrier, but those who have tried to get torpedoes into deck tubes in a seaway can probably form the best judgment of how long it is going to take, on a rolling and pitching ship, to get a succession of bombing planes onto a flying deck and successfully off it.

On both these counts the carriers are apt not to be ahead with the scouts, but well within the protection of the battle fleet. Some would put them fifty miles in the rear, but until contact with the enemy is established it is never quite certain which is the rear, nor that some light planes from enemy scouts would not discover and raid them from the side. Better the immediate protection of all the anti-aircraft guns of the fleet.

We may now attempt some visualization of what will happen when two fleets meet. In the first place the possession of aircraft fitted with wireless vastly extends the scope of vision and materially lessens the chances of surprise. With any adequate scouting a commander should know of the presence of a fighting force, either air or surface, at greater distance than ever.[2] Given flying weather, not always obtainable at sea, it is probable that contact will be established by small planes carried by scout cruisers, rather than by larger scouting planes based on the carrier, the sustained radius of action of the cruiser more than compensating for the smaller radius of action of its plane.

Ordinarily each scout surface force would try to drive in the

[2] Again quoting, the following is exactly what could not happen unless all hands and the cook had been previously drugged:

"When a battleship fleet is attacked by airplanes, the attack comes with such suddenness that the airplanes, which are 'tied' to the ships and carriers cannot possibly get warmed up and into the air before the attack is over and the attacking craft have flown far from the scene. . . . A fighting force of aircraft tied up with a water fleet would certainly appear to be of little defensive value against aerial attacks. A battleship might as well take along submarines to combat enemy submarines."—*Scientific American*, April, 1924.

It might be added that if any fleet commander is so totally ignorant or neglectful of elementary scouting as this implies, his ships could be as easily sunk with destroyers or for that matter with rowboats.

opposing screen to the extent necessary to uncover the main fleet, but with scouts in the air such informatory fighting will be reduced to a minimum. It is more probable that the elusive planes will drive right for their objective, which is information of the whereabouts and strength of the enemy, sending back their news by wireless, whether they return themselves or not.

Fairly in contact but still beyond gun range, the carriers unlimber, for their planes must not only get into the air but get altitude. It is at this point that the formula of no bombers, but two pursuit planes to one enemy bomber, would be tested. On the one side the bombers, to give them full scope, have obtained their altitude and are driving for the battle fleet. They have some protecting combat planes and their faster escorts are prepared to lay smoke screens. They meet an outnumbering force of smaller and faster planes.

The pursuit planes have orders to attack in pairs, two being an ideal number to attack a bomber without interference with each other. Smoke screens are designed to blind anti-aircraft guns but will cut little figure against planes in the air.

Conclusions may, and doubtless will, differ, but it is hard to imagine, in such a mêlée, any serious damage to the battle fleet. This is no target practice on anchored ships, with leisure to come straight up the wind and to circle for another try if blown off. If the machine guns of the pursuit planes fail to stop a bomber there is always the last resource of deliberate collision, which neither plane would survive.

With the enemy bombers stopped, the superior fleet, as above indicated, has little need of bombers of its own. Its air resources, however, are not exhausted. If it remains in undisputed command of the air, even with a few surviving light planes, this advantage can be capitalized. A vertical smoke screen between the fleets, such as was demonstrated at the *Virginia-New Jersey* bombing, with only its own planes above it spotting salvos, would seem as great an advantage to a fleet as a squadron of bombers.

As a general principle, therefore, it would seem that a fleet which relies on the strength of its primary weapon, the big gun, can best devote its aircraft carrier capacity to the protection of that weapon against air attack, rather than to adding a small fraction in the shape of bombing planes to its offensive power.

PETROLEUM PROBLEMS OF THE WORLD WAR

A STUDY IN PRACTICAL LOGISTICS

By Captain Paul Foley, U. S. Navy

I. The Bunkering Problem of the British Grand Fleet

PETROLEUM as a factor of vital importance in the further conduct of the World War loomed suddenly large upon the horizon during the summer of 1917 in connection with the question of fuel supply for the British Grand Fleet, which, due to the cumulative effect of tank steamer breakdowns in continued war service, the adoption of convoy sailings which had slowed up deliveries, and increasing consumptions by American destroyers in the war zone, then began to assume serious, even alarming, proportions. The intensive enemy submarine campaign, coupled with threatened raiding operations by German cruisers, served to increase the general anxiety.

In July, the Prime Minister himself represented by cable to the American Government that unless a shortage of 300,000 tons of fuel oil could be made good by September the immobilization of the Grand Fleet itself was threatened.

The following letter from Lord Northcliffe, quoted by Ambassador Page in his published *Memoirs* refers to this crisis:

> In great privacy let me tell you of an enormous responsibility that was placed on my shoulders one midnight in the form of a desperate cable from A. J. B. (Mr. Balfour) as to the immediate putting of our fleet out of action owing to an apparently suddenly discovered great shortage of oil. I had only been here a few days, but long enough to know that such fuel is already scarce here. I knew that that cable, if disclosed, would cause such a jump in the oil market as had never been known. I was up bright and early, I can assure you. A little cautious pussyfooting as to the oil fuel situation brought no comfort—great demand, small supply—nothing doing. I read and re-read that telegram and finally called up the Standard Oil head man. We met, and I gave him the cable to read, despite its "Most Urgent Most Secret" inscription. He read it slowly twice, and gave it back to me, saying, "If it can be done, it will be done." I said nothing whatever about price. These people started in right there and oil is pouring across

the Atlantic with giant strides and at a lower price than we have averaged over here. They could have squeezed millions out of our trouble if they had chosen. When I thanked them, they merely remarked, "It's our war as well as yours." I can imagine the panic at No. 10 if they had known that I had disclosed that cable to the oil controllers.

The allied command had little real understanding and correspondingly little appreciation of the almost superhuman effort made by the American Petroleum Industry, acting through the Petroleum War Service Committee of the Council of National Defense, A. C. Bedford, chairman, to meet by withdrawals of tank steamers from every non-essential trade route and by intercompany trade adjustments, the grave situation presenting itself. It is sufficient for the moment to say that in spite of everything that could be done, and for reasons more fully explained in later chapters, the demands for tank tonnage in the war zone increased so rapidly that by October a point was reached where any further withdrawals from the U. S. coasting service would have completely upset the war effort in the United States, and thus created a situation equally disastrous to the allied cause.

At this juncture in the war relations of the two countries Walter Long, the Secretary of State for Colonial Affairs in the war cabinet, was designated as harmonizer for Great Britain in all petroleum matters, and there was set up in London H. M. Petroleum Executive, which with Professor, afterward Sir, John Cadman as chairman, assumed executive control over all petroleum questions arising in connection with the prosecution of the war. At the same time, a special petroleum mission, consisting of L. I. Thomas, a director of the Standard Oil Company of New York, and the writer, was sent to London, jointly representing the U. S. Navy Department, the Shipping Board, which had then requisitioned all privately owned tank tonnage, and the Petroleum War Service Committee with instructions to say, in confirmation of the personal assurances given Lord Northcliffe, that America could be depended upon to supply all of the Allied requirements of petroleum products whatever might be the sacrifice, but that in return it must be understood that all tank tonnage was to be used in the most economical manner possible.

The contract thus established was productive of such immediate practical result as to pave the way for an orderly and satisfactory

solution not only of the special problem in hand, but of the associated problems arising on the continent and in the Far East.

The question of the moment, however, is the bunkering problem of the Grand Fleet, which, at the close of 1917, numbered fifteen oil-burning dreadnaughts and battle cruisers, seventeen oil-burning cruisers, and 125 oil-burning destroyers. Additional to the above there were thirty-three pre-dreadnaught battleships and cruisers burning coal and oil, and twelve light cruisers burning coal and oil.

The bunkering problem attached to this fleet was that of deliveries into consumptions in four separate areas: the Grand Fleet proper at Scapa Flow, the Harwich force, the Channel patrol, and the Queenstown force. The special problem at Scapa was one not of bulk deliveries alone, but of ability to refuel all units simultaneously or practically so, which necessitated the constant employment in fleet attendance of upward of seventy tank steamers, large and small. The practice was to accomplish a complete refueling in four hours. The limiting condition was that of weather. The protection was negligible and the time during which any type of vessel could lie at any sort of wharf was measured in hours not in days.

Expressed in terms of sea transportation, the fuel problem of the Grand Fleet was to move across the sea lanes 450,000 tons of fuel oil monthly, and to make good a 300,000-ton shortage in reserves; all in the face of a shortage of 150,000 tons of available carrying capacity.

Earliest among the adjusting arrangements made was that providing for the transportation of fuel oil in the double-bottom compartments of general cargo carriers and transports. Under any conditions other than stress of war, proposals of this character would have received scant consideration. Nevertheless, from August, 1917, until the Armistice, over 1,000,000 tons of fuel oil for Admiralty account were regularly transported in this manner.

However ingenious this expedient, it was not an unqualified success, as the loading interfered with flexibility in routing, and in the case of vessels carrying dead-weight cargoes, such as grain or wheat, actually shut out an equivalent dead weight. This was a very serious matter, indeed, as the wheat position was as serious as that of fuel.

In December of 1917 there were 900,000 tons of wheat at tide-

water American ports, earmarked for shipment to the United Kingdom, and no tonnage to move it, the visible supply of wheat in Great Britain being the equivalent of from two to three weeks' consumption. In this serious situation as to wheat, the British elected to move fuel oil, fuel oil for their fleet rather than food for their people.

The cylindrical tanker was another unique war expedient, meaning the conversion of general cargo carriers into tank steamers by the erection of vertical cylindrical steel tanks in the cargo holds. This was a dangerous practice on account of the explosive gases accumulating in the vacant spaces between tanks and lying low on the floors of the ship.

The expedients did not pertain alone to the sea. The British Petroleum Executive was untiring in its effort to stimulate the production within the United Kingdom of oil suitable for use as fuel, whether from coal tar and blast furnaces or the distillation of Scotch shales, of cannel coals, or of pitch and coal tar. In April, 1918, the British Government offered a prize of £2,000 to anyone who could produce by these or similar methods, a fuel acceptable to the naval authorities. How little productive of result were these efforts, and how completely dependent upon outside sources of petroleum supply England was, is best indicated by the fact that of the total oil fuel supplied the Grand Fleet from July to December, 1918, namely 2,213,000 tons, only 108,000 tons was manufactured within the United Kingdom.

The outstanding accomplishment associated with supply to the British Grand Fleet, alike from the viewpoint of military importance and of popular appeal, was the construction of the Glasgow-Grangemouth pipe line.

Difficult as the matter of fuel supply had previously been, it increased in complexity with the laying down of the North Sea mine barrage, which involved shifting the base of the Grand Fleet from Scapa to Rosyth in the vicinity of Edinburgh.

The only routes by means of which fuel could be brought to the new base were through the English Channel, flanked by the German Fleet, or round the North of England and through the mine field itself. It was analogous to passing through no man's land to reach one's own trenches.

Enemy submarines were quick to take advantage of the opportunity and tank steamer losses increased at an alarming rate. When nine steamers had been either sunk or seriously damaged it became apparent that something must be done, and quickly. The Admiralty first proposed to set up a line of tank barges over the canal from Glasgow to the Forth. In lieu of this the American Mission suggested a pipe line. After considerable discussion as to pipe-line practice in the United States, the Admiralty was won over to the project and cable request was made for the services of a qualified expert to advise the Admiralty.

There was visible interest even in war-weary London at the announcement that Forrest M. Towl, president of the Eureka Pipe Line Company and constructor of 3,000 miles of pipe line, was on his way. London was fed up with diplomats, bankers, soldiers and war philanthropists. It wanted something different. Somehow the very name, Eureka, conjured up visions of the West, and the secret hope that at last London was to see the American of the movies, a two-fisted, two-gun, fighting leader, with chaps, lariat and quirt. When, instead, there appeared a Beau Brummel personified, associated with a pipe line, amazement was complete; but when, in answer to some question relative to capacity, the gentleman pulled out a pipe-line slide rule, they simply passed out. "Peace hath her victories, no less renowned than war." Aladdin with his wonderful lamp was a piker in contrast to Forrest M. Towl and his pipe-line slide rule. They never ceased talking about it. "My word," said one sea lord, "Such mental gymnastics I never dreamed of."

Within a week of his arrival, Mr. Towl had walked over the route, about thirty-six miles in length, submitted his report, and was on his way to Liverpool. At Liverpool came a wire asking that he return to London to advise the Admiralty as to the accepted practice in the United States as to design of pumping stations, to which he replied, "We build them first and design them afterward." Curiously enough this went over in great shape; that's what the Admiralty did—built the boilers, pumps, settling tanks, etc., in the open, and put a wall around them and a roof overhead.

In order to avoid the possibility of labor troubles by the in-

troduction of American civilian labor, as well as to permit the use of German prison labor if necessary, a pipe-line unit, about 250 strong, recruited among the pipe-line employees of the United States, was enlisted in the naval service of the United States, and sent to England under the direction of W. A. Barstow, and Forrest M. Towl, Jr. The pipe and material for pumping stations were assembled in the United States and shipped abroad. With the assistance of a detachment from the Royal Marines, a ten-inch pipe line, thirty-six miles in length, doubled at all underwater crossings, was laid in eight weeks. When the unit had hit its stride it laid a mile of pipe a day. The eastern terminus of the line was at Grangemouth, within sight of the Rosyth dockyard, and the western terminus at Old Kilpatrick, a suburb of Glasgow.

In conjunction with these efforts, there had been provided by August, 1918, bulk storage at British tide-water ports in the aggregate of 12,000,000 barrels, a scant 2,000,000 tons. This was so distributed geographically as to provide storage in the lee of the naval forces at all times, incidentally providing against destruction of all the accumulated reserves by bombing attack.

By September, 1918, the bunkering problem of the Grand Fleet had been made secure and the way opened for consideration of a problem vastly more complex—that of deliveries of kerosene oil

GREAT BRITAIN

Estimated Requirements of Petroleum Products, July 1, 1918, to December 31, 1918. Showing Sources of Supply—Expressed in Tons.

Source of Supply	Fuel Oil	Gas Oil	Kerosene	Aviation Spirit	Motor Transport Spirit	Other Spirit	Lubricating Oil	Total
Home Production...	108,000							108,000
U. S. A. North }	1,602,500	75,750	224,000	84,000	245,100		195,000	2,426,350
U. S. A. Texas }								
Mexico...	180,000	6,250	32,000		15,000		15,000	248,250
Trinidad }	70,500		2,500		5,000			78,000
Curacao }								
Egypt								
Persia	225,000							225,000
Burmah	3,500							3,500
Borneo	24,000				38,400	9,600		72,000
Total	2,213,500	82,000	258,500	84,000	303,500	9,600	210,000	3,161,100

Requiring to transport the continuous employment of 117 tank steamers of 10,000 dead weight each.

in the Far East, involving questions of supply, transportation and diplomatic relations of states, all of which will be discussed in a

separate chapter. As a preliminary to understanding thereof, there is set forth above a summary of the British program of petroleum requirements, showing the sources of supply for the six months' period July 1 to December 31, 1918. There is set down also the return of the British Ministry of Shipping, showing the distribution of all tank tonnage flying the British flag, a considerable part of which was American owned, as of July 15, 1918.

DISTRIBUTION OF TANK TONNAGE FLYING BRITISH FLAG
July 20, 1918

Return by British Ministry of Shipping

EMPLOYMENT OF VESSELS	Number	Gross Tonnage	Percentage of Tonnage
(a) Fleet Attendance (Home and Abroad)	86	136,843	11.67
(b) U.K. etc. America	74	417,947	35.59
(c) U.K. Mexico	11	81,959	6.98
(d) Mexico—East Coast South America			
(e) Atlantic Coastwise	4	11,630	.99
(f) Pacific Coastwise	1	2,253	.19
(g) Canada—Great Lakes etc.	3	2,720	.23
(h) Chili. Nitrate Fields etc.	3	6,642	.57
(i) Pacific Coast. West Coast South America	(See (h) above).		
(j) Trinidad etc. U.K.	5	24,004	2.04
(k) Trinidad. Cape Town. Borneo etc.	3	15,519	1.32
(l) Circular Tour	8	50,468	4.30
(m) U.K. Far East etc.	2	10,966	.93
(n) Rangoon—India	7	20,557	1.75
(o) Abadan—India	1	3,637	.31
(p) Far East. Egypt and Mediterranean	6	32,517	2.77
(q) Abadan. Egypt and Mediterranean	18	94,551	8.05
(r) Dutch East Indies. China etc.	..	.....	
(s) Molasses	3	5,509	.47
(t) Residues from Toluol Benzine	2	9,646	.82
(u) Miscellaneous	8	20,605	1.75
(v) Allotted to France	5	21,696	1.85
(w) Repairing and Docking	36	204,609	17.42
	286	1174,278	100.00

2. France

As the outstanding petroleum requirement in England was that of fuel oil for the naval forces, so, the outstanding petroleum requirements in France were of aviation spirit and motor transport spirit for the armies; expressed in American terminology, high and low gravity gasoline. The technique of supply and distribution of this commodity was fundamentally different from that attending the supply and distribution of fuel oil and vastly more complicated.

Fuel oil is an inert product, the transportation of which, in bulk, is attended with no special fire risk. In emergency it can be, and as has been pointed out, actually was, transported in the double bottoms of cargo-carriers. Gasoline is a highly inflammable product, transportable in bulk overseas only in special types of carrier known in the trade as "clean" tankers, such transportation being attended under war conditions with very considerable fire risk, especially at the point of discharge. Fuel oil was delivered in bulk at tide-water points and there redelivered in smaller bulk into the bunkers of naval units; but gasoline in bulk at tide-water French ports was still a long way from destination. There remained the problem of breaking the bulk deliveries down into tins and drums for further delivery, not to 500 consuming units as in the case of fuel oil, but to 750,000 different consuming units scattered from the western front to the Bay of Biscay, and from Cherbourg to the Riviera. Most of the complications and perplexities attending these deliveries, as Senator Berenger, commissioner general of petrol, pointed out, arose from the fact that unfortunately France was the allied battlefield.

In terms of gasoline supply, the allied battlefield was not alone the battle front and the lines of communication leading thereto. It had to do also with the lines of communication of the British armies in Egypt, Mesopotamia and Italy, from Cherbourg to Marseilles; with that of the United States naval aviation forces on the west coast from L'Orient to Paulliac; with that of coal supply to Italy from Bayonne to Marseilles, and with the operations of the forestry corps in the Pyrennes area. In addition it had to do with the going daily activities of the embarkation, division, rest, stevedore and prison camps behind the lines; with the ammunition, remount and aviation depots; the engine and motor

transport terminals; with all hospital activities, and, finally, with the multitudinous construction activities of the American Expeditionary Force.

BRITISH ARMY IN FRANCE

The daily consumption of gasoline by the British forces in northern France during the period of stabilized or trench warfare averaged about 290,000 Imperial gallons, equivalent to one bulk tank steamer cargo daily. Of the total amount, 230,000 gallons were of motor transport spirit and 60,000 gallons of aviation spirit; 350,000 gallons daily were delivered in bulk, leaving 255,000 gallons which were filled in cans and cases. The area behind the British lines from Paris to the Channel was served by two lines of rail communication, designated as northern and southern.

The northern line extended from Calais via St. Pol to Amiens, with easterly connections to the battle front, and westerly connections from Amiens to Etaples and Boulogne. Associated with this there were four principal channel crossings each assigned to a special military purpose deserving attention. These were; (a) Dover-Calais, used for the transfer and replacement of combatant troops, munition supply, and the evacuation of the wounded to England (b) The Folkstone-Boulogne route, used exclusively for the passage of officers and men on leave and officials of government; (c) The Kingston-Folkstone-Dunkirk air route, used in the delivery of military airplanes and the return of delivery pilots to England; (d) The Southampton-Calais route, used in the transportation of American troops to service in the British area.

Supplementing and in general parallel to the rail routes described, there were two complete systems of military roads, of which that next behind the battle front, designated as the Route Ga-dée, was maintained in perfect condition by enemy prison labor at all times and reserved for emergency battle use. The second road system in rear of the lines was the auxiliary line of motor transport supply. Lateral communication from the rail heads was effected entirely by means of motor transport.

The southern line of rail communication for the British Armies in France extended from Havre through Rouen to Amiens, and through Beauvais and Clermont to Soissons. It was also connected through Paris and the French rail line to the southern

aerodromes in the vicinity of Nancy. The channel crossing from Southampton to Havre was applied to activities not directly associated with the zone of the armies, that is the transfer of civilians, Red Cross workers, Salvation Army, "Wacs," etc. As in the case of the northern line, all lateral activities were carried on by means of motor transport.

The focal center of the whole system in the north of France beyond Paris was Amiens. When that city was evacuated in the March drive and its railroad bridge destroyed, through communication from Paris to Boulogne and Calais was also almost entirely dependent upon motor transport, which at times had to pass through Amiens while the city was under fire.

The gasoline supply for the northern line of communications was derived from the bulk installation at Calais; that for the southern line from a similar installation at Rouen. Bulk storage at each of these places was provided in the amount of 7,000,000 gallons each. A third installation of like capacity was under construction at Rouelles on the outskirts of Havre. In connection with the bulk installations at Calais and Rouen, there were filling plants having a daily capacity of 150,000 gallons each, together with plants for the manufacture of cans to a capacity of 5,000 each. These cans averaged five trips each to the front before becoming unserviceable. Bulk deliveries inland were made by rail tank cars of 3,600 gallons capacity each to rail heads, and there transferred to road tank lorries of 600 gallons each. The road tank lorries in turn delivered to other units either by means of pumping directly into the tanks of units, or, where that process was unworkable, decanting into cans of four gallons capacity each in possession of units. Bulk deliveries to the southern aerodromes were made periodically in train loads of thirty tank cars each discharging at rail sidings near the dromes into smaller tanks of about 12,000 gallons capacity.

FRENCH ARMY IN FRANCE

The basic rail communication serving the French battle front was the Paris-Chalons-Toul line, connected with the channel ports in the north via Havre and Rouen, and with Mediterranean ports via Marseilles, Lyon and Dijon. American troops landed at English ports and intended for assignment to the southern area were conveyed across channel by fast transport and landed at Havre.

Transfers of French colonial troops were effected via the southern extension from Marseilles.

The collateral activities of the French in the back areas, all depending upon motor transport, were as diversified in character, and far more comprehensive in scope, than the activities behind the British lines, not only on account of the numerical strength of the forces engaged but also because the centers of essential French war industry were themselves in France and not in England.

The gasoline consumption of the French on their own account, before the war of movement began, averaged 1,000,000 gallons daily; that is, the equivalent of four bulk tank steamer cargoes. The principal centers of supply were at Havre and Rouen in the north with bulk storage in the aggregate of 42,000,000 gallons; Marseilles-Cette in the South with 28,000,000 gallons; Bordeaux-La Pallice in the West with 21,000,000 gallons; in all about 90,000,000 gallons. Additional tankage under construction aggregated 30,000,000 gallons.

Against the going requirements of a million gallons, the maximum daily canning capacity at the ports was 300,000 gallons. About the same capacity was delivered in bulk in fifty-two tank barges of 100,000 gallons capacity, each traversing the canals which, fortunately, paralleled the rail routes described, and 30,000 gallons daily were delivered by 700 railway tank cars which, on account of traffic congestion, averaged only one round trip monthly. The deficiency to be made good was thus about 300,000 gallons daily. One very far-reaching and practical consequence of this acute shortage in delivery facilities was to convert the General Petroleum Committee of France, which theretofore had been a purely administrative and advisory organization, into an executive organization, acting in the name of and with the sanction of the ministries, and empowered with supreme authority in matters connected with French petrol supplies during the war, and with the preparations necessary for ensuring postwar supplies. This was the *Commissariat Général Aux Essences et Combustibles,* (Petrol and Fuel Commission), Senator Henri Berenger, commissioner. This was, in effect, a petroleum ministry. The principal measure undertaken by the Petrol and Fuel Commission to rectify the deficit in distribution facilities inland and second in importance to

the Glasgow-Grangemouth pipe line, was the construction of a clean product pipe line between Havre and Rouen.

The transportation of petroleum supplies in tank steamer or barge over the crooked course of the Seine, the main channel for the conveyance of supplies of every description evacuated through Havre, was a matter of grave concern to the responsible allied officials. The presence at Rouen of 52,000,000 gallons of gasoline in bulk storage at the works of the Bedford Petroleum Company, on the banks of the Seine and only a short distance from the principal locomotive repair shop of northern France, was a matter of still greater concern. Had the enemy thought less of air raids upon London and Paris and concentrated his effort upon the bulk installations at Rouen, there would have swept down the Seine a fiery flood that would have obliterated this line of communications. The menace was so grave as actually to be undiscussible in the fear that unguarded conversation might suggest to the enemy that which he lacked the imagination to think of for himself. Of all the offensive bets that he overlooked, this was by far the biggest and best. Except for the Armistice, the Havre-Rouen pipe line would soon have been an accomplished fact. The route had been laid out by American engineers, the material ordered in the United States, and the construction by the Glasgow pipe-line construction gang was about to start.

Following is a statement of the French program of requirements from July to December 31, 1918, together with the agreed sources of supply.

FRANCE

Estimated Requirements of Petroleum Products, July 1 to December 31, 1918
Showing Sources of Supply—Estimated in Tons

Source of Supply	Fuel Oil	Kerosene	Aviation Spirit	Motor Transport Spirit	Other Spirit	Lubricating Oil	Total
Home Production							
U. S. A. North	45,000	132,000	45,000	174,000		81,000	477,000
U. S. A. Texas							
Mexico							
Trinidad							
Curacao							
Egypt				24,000			24,000
Persia							
Burmah							
Borneo							
Sumatra			15,000	12,000	15.000		42,000
Total	45,000	132,000	60,000	210,000	15.000	81,000	543,000

AMERICAN EXPEDITIONARY FORCE

The fundamentals of the problem of the American Expeditionary Force in France were to provide for the introduction and maintenance of an army of 4,000,000 men in France without disturbance to the going activities of France, England and Italy on the western front or to the activities of those countries in the rear areas.

The main lines of communication in the sphere of American activity which covered, roughly speaking, the entire southern half of the country, radiated inward from Brest, St. Nazaire, La Pallice and Bordeaux on the west coast to the Tours-Orleans quadrangle, and thence in an easterly direction, parallel, and to the southward of the French rail line, terminating in the Neufchateau-Chaumont area. There was a southern connection from Marseilles via Dijon into the forward area.

Petroleum products landed at the base ports where bulk storage was either provided or in course of erection were distributed inland principally by means of 1,600 tank cars making from two to three trips each per month. Additional to these facilities there were assembled 525,000 *bidons* of thirteen gallons capacity each, and 170,000 drums of fifty gallons capacity each, all of which were manufactured at the Gièves fabrication center. The gasoline consumption of the American Expeditionary Force during the construction period and before there were any troops in the line at all averaged 500,000 gallons daily. The distinguishing feature of the distribution scheme devised by the American Expeditionary Force, in contradistinction to the procedure of France and England, was the early provision made for supplies in a war of movement by means of a system of field filling stations, and gasoline dumps placed on the same principle as ammunition dumps. The filling stations which now dot the United States originated in France, and, alone, made the Argonne advance practicable. In a general way these stations stretched from Silly-le-Potiers, which was just west of Soissons, to a station down in the Vosges region not very far from the Swiss border, the truck train supply station for the advance in the Argonne district being at Claremont-en-Argonne.

It is the present opinion of the men who, as officers in the American Expeditionary Force, organized the distribution system

behind the American Army and were then, as now, permanently engaged in the oil business, that the filling station system is not sufficiently flexible to take care of the advance by an entire army and that the correct organization for the future should be a combination of the American and European procedures already described. The tank car and filling station system is excellent for the areas in the rear, primarily because of its economy in the use of men and, also, because it is not as wasteful of gasoline as other systems. It is not, however, sufficiently flexible nor subject to such rapid expansion as the package system devised by the British and French. The filling station system, moreover, requires complete special equipment including tank cars—themselves subject to sabotage or destruction by artillery fire in the combat zones—storage stations, pumps and tank trucks. All this equipment can be used for one purpose alone—to handle gasoline. In the event of rail or road congestion it is considerably more difficult to get an assured supply forward when that supply requires special equipment.

In the shifting conditions attaching to an active battle front, a point is reached in the service of supply where no instructions previously given, or rigid system previously provided, can possibly meet every contingency. The line goes forward here and gives ground there, the areas of confusion between being the areas of final decision. It is in this phase of the attack that the package system reaches the highest point of flexibility and efficiency. Two and four gallon containers may be thrown forward in any sort of conveyance, rail or road, flat car, box car or lorry, and thrown off wherever and whenever required.

There is set forth below the six months' schedule of petroleum requirements of the American Expeditionary Force corresponding to those in the case of the other countries. The purpose of presenting these in succession is to facilitate the presentation in a later chapter of the master statement in which the total re-

UNITED STATES OF AMERICA
Estimated Requirements of Petroleum Products, July 1 to December 31, 1918
Showing Sources of Supply—Estimated in Tons

Source of Supply	Fuel Oil	Kerosene	Aviation Spirit	Motor Transport Spirit	Lubricating Oil	Total
U. S. A. North.....	240,000	6,180	33,880	154,995	11,234	446,299

quirements of the Allies are assembled in terms of sources of supply, and the tonnage available balanced against the total requirement.

Reviewed in the perspective of six years it is clear that next to the physical number of bayonets on the western front, the factors contributing most to victory were the impetus conferred upon those bayonets, and the flexibility given them by gasoline. Tank, tractor and aviation activities all were measured in terms of gasoline. It evacuated the wounded and effected replacement of combatant troops. Gasoline saved Paris in 1914 and, by enabling the French to concentrate hundreds of thousands of troops at the weakest points of the enemy's line without his knowledge, it definitely saved Verdun. It stabilized the line at the Marne in 1918, and was absolutely essential for the Argonne advance. With this agency the Allies won; without it on a quantity basis, the enemy lost. Not in exaggeration was it said that a drop of petrol had been the equivalent of a drop of blood. The torch borne high on Flanders Fields was a gasoline torch.

3. Italy

As compared with those of England and France, the bulk requirements of Italy were not large. The miltary and naval activities which these products supported, however, were each of prime importance in the prosecution of the war. These were, (1), motor transport spirit for the army of northern Italy, any further reverses on the Italian front meaning a further weakening on the French front; (2), fuel oil and gasoline for the British, French, Italian and United States naval forces based at Taranto, Brindisi and Corfu, covering the Adriatic Sea, and the communications to the armies in Mesopotamia and Palestine; (3), kerosene oil deliveries in connection with the Italian agricultural tractor program, which contemplated the introduction of 8,000 kerosene-driven tractors for harvesting purposes in replacement of the bullocks killed to provide meat for the soldiers (Mr. Milliani, minister of agriculture, was prepared to prove that one ton of tractor kerosene would produce three tons of wheat); (4), aviation spirit for the British, Italian and United States naval aviation units scattered throughout Italy.

The internal administration of petroleum affairs in Italy was

conducted through a petroleum committee of which Commander Giufrida was chairman. This committee was quick to appreciate that the most conspicuous service which Italy could render the allies in connection with petroleum supplies was to minimize the demands upon tonnage by rigid curtailment of Italian requirements. Nowhere in Europe were the restrictions upon the use of petroleum for non-essential war services so severe as, or more rigidly enforced than, in Italy.

There is given herewith the complete program of Italian requirements from July 1 to December 31, 1918, with the sources of supply. The transportation of these products involved the continuous employment of nineteen steamers of 10,000 dead-weight each.

ITALY

Estimated Requirements of Petroleum Products, July 1 to December 31, 1918
Showing Sources of Supply—Estimated in Tons

Source of Supply	Fuel Oil	Kerosene	Aviation Spirit	Motor Transport Spirit	Lubricating Oil	Total
Home Production...						
U. S. A. North.....	126,000	86,125	3,000	90,000	30,000	335,125
U. S. A. Texas.....						
Mexico.....						
Trinidad.....						
Curacao.....						
Egypt }						
Persia }	54,000			30,000		84,000
Burmah.....			18,000			18,000
Sumatra.....						
Borneo.....						
Total.....	180,000	86,125	21,000	120,000	30,000	437,125

4. The Inter-Allied Petroleum Conference

The facts that have been thus far presented were nowhere set down in black and white so that he who ran might read. They were, on the contrary, literally dug out in the course of the day's work by painstaking inquiry supplemented by personal investigation on the ground. There was no semblance whatever of co-ordinated effort. The navies, armies and air forces of the countries engaged in the war were each acting independently with respect to their petroleum supplies—each without knowledge as to the activities of its associates, and all without information as to conditions at the principal source of supply, the United States. The proposition was: Who could raise the most clamor? An officer attached to the American naval headquarters at London

described the condition prevailing by observing that the more he saw of the Allies, the less respect he had for Napoleon.

The imperative necessity of providing a central agency to agree and coördinate programs was obvious. The question was not so much what should be done as how it should be done, having regard to the fact that the United States, as the largest single owner of tonnage, was the giver of tank tonnage.

The many questions arising in connection with troop transport and general cargo tonnage had been provided for by the formation of the Allied Maritime Transport Council, an organization convened in London in March, 1918, pursuant to an agreement reached at the meeting of the Supreme Economic Conference at Paris in December, 1917, later known as the Paris Conference. In the minutes of the preliminary meeting held at the British Foreign Office on February 15, 1918, at the invitation of Lord Robert Cecil, Paul Crosby of the Committee on War Purchases and Finance representing the United States, the purpose of the Allied Maritime Transport Council was described as being:

> To watch over the general conduct of allied transport and, while leaving each nation responsible for the *management* and *supervision* of the tonnage under its own control, to secure the necessary exchange of information and coordination in policy and effort on the part of the four governments of France, Italy, the United States of America and Great Britain, in adjusting their programs of imports to the carrying capacity of the available tonnage, having regard to naval and military requirements, and in making the *most advantageous allocation* and *disposition* of the tonnage under their control in accordance with the urgency of war needs.

The words *management* and *supervision* as used above, which are italicized by the author, manifestly had reference in their commercial acceptance only to matters of internal discipline and administration, manning, victualling, upkeep, etc. These remained under the control of the respective governments. The terms *allocation* and *disposition* had reference to character of service and voyage assignment. These were to be under the control of the council in which Great Britain, as the largest single owner of cargo and passenger tonnage, necessarily and rightfully had the controlling voice.

In order to carry out the purpose so defined in a practical way it was proposed that the council obtain through its permanent staff, the programs of import requirements drawn up by the inter-

allied executive committees, which had either then been or were about to be set up, and against these balance tonnage and make the necessary assignments. The term "interallied" was employed instead of allied alone because of the fact that the United States, strictly speaking, was not an ally, but an associate in the war. The main executive committees referred to were: (1) the wheat executive; (2) the food executive with five sub-committees; (3) the raw material executive, with seven sub-committees; (4) the general munitions council, with seven sub-committees, and (5) the coal and coke committee, having four sub-committees.

The British proposal with respect to petroleum programs was that an interallied petroleum executive should be set up, bearing the same general relation to the Allied Maritime Transport Council as the main executives enumerated, and, like them, answerable to it. The principal argument favoring this procedure, and a very reasonable one, was that, insomuch as over 600 cargo and passenger vessels were carrying fuel oil in double bottoms, shutting out over 600,000 dead-weight tons of other cargo, and having regard to the fact that considerable quantities of lubricating oil were being shipped in barrels, the question of tank tonnage was interwoven with and inseparable from the general problem of cargo and passenger tonnage. Other considerations, however, served to make an arrangement of this character unacceptable in the United States.

The tank steamer, the bulk of which were American owned, as an instrument of sea transport, is not, like the cargo or passenger steamer, a common carrier available in peace to all shippers alike, "loading on the berth" as the expression is, on the principle of an express wagon ashore. The tank steamer is rather the utility of a single owner for his own special purposes, on the principle of a department store delivery wagon.

The American flag tank tonnage, requisitioned by executive order in the summer of 1917, had been constructed by the American oil companies for their own use, as integral parts of the oil business, essential to the conduct of that business, and in carrying capacity exactly balanced against the pre-war requirements of the oil industry. There was no surplus available to meet distended war requirements overseas, especially when accompanied by a sixty per cent loss of efficiency in normal turn-around.

To place the assignment of such tonnage, necessary alike in the transportation of crude oil to the seaboard refineries and in the transportation of refined products overseas, in the hands of any council of men, no matter how well meaning, who of necessity had no comprehensive grasp of the petroleum industry in all its aspects, was regarded in the United States as an unwarranted and unworkable proposal, calculated to destroy rather than to conserve. There was, moreover, in the United States a strong feeling that British flag tank tonnage engaged in the transportation of products from the eastern producing fields, was not being used to the best advantage, and that tonnage savings would accrue by diverting this tonnage to the trans-Atlantic trade.

The disagreement was composed by setting up the Interallied Petroleum Conference as an associated rather than as a subordinate activity of the Allied Maritime Transport Council, the agreements reached being reported to, but not subject to review, by it. Decision as to the assignment of tonnage against program remained in the United States, and the question of tonnage savings through re-routings was left open as a matter of separate negotiation between the British and American representatives. On this basis of organization, the Interallied Petroleum Conference functioned harmoniously and efficiently to the close of the war.

Additional to consideration of the fundamental problems of programs, sources of supply, and tonnage against program, the conference, which met for the first time at Paris on May 6, 1918, and monthly thereafter at London, Paris and Rome successively, took up and adjusted such collateral questions as the unification of specifications of products to a workable basis, the protection of bulk stocks against fire, explosion, and enemy action, the discharge of tank steamers at French ports under their own steam, an examination of the storage position in France and Italy, an examination of the tractor program of Italy, increase of storage facilities west of the straits of Dover, improving, by exchanges of tank cars, tank lorries, and priorities on material, French deliveries inland, and, finally, the question of the Havre-Rouen pipe line, all in the period from May to November, 1918.

The master statement of requirements, agreed sources of supply, and tonnage against requirements, as given in this paper, supplements the programs of individual requirements by

Table I

Master Statement Allied Petroleum Requirements
Paris: August 1, 1918

Statement showing Requirements of Petroleum Products by Great Britain, France, Italy and United States, Naval and Military Forces operating in Europe for the period from July 1, 1918, to December 31, 1918. Also Estimates of Tonnage required to transport same from Agreed Sources of Supply, Program approved by Interallied Petroleum Conference on August 3, 1918. Tonnage balanced against Program by Sub-Committee of Interallied Petroleum Conference, Calculations made on ascertained Length of Voyages, Otherwise at 200 Miles per Day, Year Assumed to be 310 Days, Allowing fifty-five days for Voyage Repairs, etc.

	Cargo Tons	Ton Days	Tons Cargo Carrying Cap.
Great Britain—Including importation of 269,500 tons of fuel oil required to bring Admiralty stocks up to approved reserve, but deducting 108,000 tons of fuel oil locally produced from shale and cannel coal. Also excluding 210,000 tons of lubricating oil, which it is proposed to ship in barrels as far as possible.	2,843,100	181,598,350	1,171,602
France—Excluding 81,000 tons of lubricating oil, which it is proposed to ship in barrels as far as practicable.	462,000	36,660,000	236,516
Italy—Excluding 30,000 tons of lubricating oil which it is proposed to ship in barrels as far as practicable.	407,125	29,808,925	192,316
United States—Excluding 11,234 tons of lubricating oil which it is proposed to ship in barrels. Note: It is also intended to ship a certain quantity of aviation naptha and kerosene in cases but for the purpose of this calculation it is assumed that all products except lubricating oil will be transported in bulk.	435,065	28,536,750	184,108
Estimate of total cargo tons and tank tonnage required to meet above program if shipment of fuel oil in double bottoms of cargo steamers had been entirely discontinued as of July 1, 1918.	4,147,290	276,604,025	1,784,542
Less—Tank tonnage not required on account of estimated shipments of 50,000 tons of fuel oil per month in double bottoms of cargo vessels during July, August, September, and estimate of 10,000 tons of fuel oil October, November, December—In all 180,000 tons.	180,000	.....	81,290
Estimate of products and tank tonnage to meet program for the last six months of 1918.	3,967,290	.....	1,703,252

Note 1—(1) Ton Days = Tons multiplied by ascertained length of voyage.
(2) Tons Cargo Carrying Capacity = Ton Days divided by 310.
(3) To convert Carrying Capacity to Dead Weight, add 10%.

Tank Tonnage Assigned Against Program

	Number	Tons Cargo Carrying Cap.
Applied by Great Britain, as per statement dated London July 20, 1918	158	1,134,482
Applied by United States as per statement dated Washington July 15, 1918	55	392,634
Applied by France	1	5,059
Applied by Italy	6	33,494
Less allowance for sinkings (war and marine) calculated at 1% monthly, 5 months.	220	1,565,669
	6	38,366
Estimated average constant tank tonnage at present assigned by allied Governments as above.	214	1,527,303
Add British tank steamer building program, average over period	14	101,450
Add tankers released from United Kingdom coastal service if double-bottom shipments are discontinued.	228	1,628,753
	2	12,500
Estimated average constant tank tonnage applicable to program	230	1,641,258
Estimated tank tonnage required to meet program		1,708,252
Estimated tank tonnage deficit excluding American building program		61,999
Add American tank steamer building program, constant over period, less 1%		64,988
Surplus of tank tonnage if American building program applied against deficit		2,989

Note: Tonnage savings arising from completion of Glasgow Grangemouth pipe line not included in above.

TABLE II

ANALYSIS OF TANK TONNAGE REQUIREMENTS BY COUNTRIES

GREAT BRITAIN

Source of Supply	Quantity Tons	Area of Delivery	Voyage	Days	Ton Days	Remarks
Home Production	108,000					
U.S.A. (North)	1,215,000	United Kingdom	U.S.A.—United Kingdom—U.S.A.	55	66,825,000	60% United Kingdom requirements to come from U.S.A., northern ports.
U.S.A. (Texas)	137,100	France (Channel ports)	U.S.A.—France—U.S.A.	61	8,363,000	
	810,000	United Kingdom	Texas—United Kingdom—Texas	70	56,700,000	40% United Kingdom requirements to come from U.S.A., Gulf ports.
	15,000	Gibraltar	Texas—Gibraltar—Texas	55	825,000	
	5,000	Bermuda	New York—Bermuda—New York	15	75,000	
Mexico	233,250	United Kingdom	Mexico—United Kingdom—Mexico	70	16,327,500	
Trinidad, Curacao	80,500	United Kingdom	Trinidad—United Kingdom—Trinidad	70	5,635,000	
Persia	250,000	Italy and Mediterranean	Abadan—Mediterranean—Abadan	70	17,500,000	
Persia	20,000	Suez	Abadan—Suez—Abadan	43	860,000	
Burmah	3,500	Mediterranean	Rangoon—Italy—Rangoon	98	343,000	
Sumatra	1,750	Mediterranean				
Borneo	24,000	United Kingdom	.....	..	.....	Double bottoms
Borneo	48,000	United Kingdom	China—Borneo—United Kingdom	166		Circular tour steamers. Requiring 1,171,602 tons of carrying capacity.
Total	2,951,100				181,598,250	

FRANCE

U.S.A. (North) U.S.A. (Texas)	396,000	French Atlantic ports Mediterranean	U.S.A.—France—U.S.A. U.S.A.—Mediterranean—U.S.A.	70	27,720,000	70 days taken as average voyage.
Borneo, Sumatra	42,000	Mediterranean	Borneo—France—Borneo	166	6,972,000	Circular tour steamers.
Persia	24,000	Mediterranean	Persia—France—Persia	82	1,968,000	Requiring 236,516 tons of carrying capacity to transport.
Total	462,000				36,660,000	

ITALY

U.S.A. (Texas)	167,850	Italy, West Coast	U.S.A.—Italy—U.S.A.	80	13,428,000	
U.S.A. (North)	107,775	Italy, West Coast	U.S.A.—Italy—U.S.A.	67	7,220,925	
Persia	114,000	Italy—Taranto—Brindisi	Abadan—Italy—Abadan	65	7,410,000	
Burmah and Sumatra	17,500	Italy—West Coast	Burmah—Italy—Burmah	100	1,750,000	
Total	407,125				29,808,925	Requiring 192,316 tons of carrying capacity to transport.

UNITED STATES OF AMERICA

U.S.A. (Texas) U.S.A. (North)	435,065	United Kingdom, France	U.S.A.—United Kingdom—France—and U.S.A.	59	25,536,750	Requiring 184,108 tons of carrying capacity to transport.

TABLE III

TOTAL ESTIMATED REQUIREMENTS OF PETROLEUM PRODUCTS
July 1, 1918—December 31, 1918—Showing Sources of Supply

Source of Supply	Fuel Oil Tons	Gas Oil Tons	Kerosene Tons	Gasoline Tons	Lubricating Oil Tons	Total Tons
From: U.S.A.	2,013,500	75,750	448,315	829,975	317,234	3,684,774
Far East	306,500	.....	.....	162,000	.....	468,500
Mexico	180,000	6,250	32,000	15,000	15,000	248,250
Trinidad	70,500	.....	2,500	5,000	.....	78,000
Home Supplies	108,000	.....	.....	.....	.....	108,000
Total	2,678,500	82,000	482,815	1,011,975	332,234	4,587,524

countries previously presented. It is deserving of the attentive study of military men as a practical working military commercial instrument, set up in the course of war, covering products essential to the conduct of the war, every item of which is based upon the accumulated experience of the war, and which, in practice, proved 100 per cent efficient.

5. THE FAR EASTERN AGREEMENT

The reluctance of the executive heads of the American petroleum industry to accept without reserve the representations made by the British authorities as to the imperative necessity of augmenting the tank tonnage in the trans-Atlantic run had its origin in the experience of the Standard Oil Company of New York in respect of its British flag fleet. Before the outbreak of the World War, this company, through its subsidiary, the Standard Transportation Company of Hong Kong, operated a fleet of nineteen steamers, the finest of their type then afloat. Under the American shipping laws as they then were, these steamers, foreign built, were ineligible to United States registry, and were accordingly operated under the British flag, even though the actual ownership was 100 per cent American, and the service in which the vessels fully engaged an integral part of a business 100 per cent American owned.

The passage of the Shipping Act of 1916 gave opportunity to transfer these vessels to American registry, which the New York Company, after due deliberation and having regard to the fact that England was in the war, decided *not* to do, taking the position that a flag which had been good enough for them to operate under in

time of peace was good enough for them to fight under in time of war; so, in the growing momentum of war these vessels were one by one requisitioned by the British Government and diverted to war service, until finally all were lost to their owners. This would have been accepted philosophically enough had not gradually the feeling grown in New York that the sacrifices demanded of that company were not being imposed to the same extent upon their strongest British competitors, the Asiatic Petroleum Company, familiarly known as the Royal Dutch Shell. The feeling was that the American owned tank tonnage was being thrown into the hazardous submarine lanes, while the British tonnage remained in the areas of lesser risk, and that American tonnage was sometimes being used, not for the benefit of the British Government, or the French Government, but for the benefit of British trade.

It so happened that the British demands for more trans-Atlantic tonnage for the Grand Fleet were coincident with information received in New York that a Standard Oil tanker had delivered a cargo into the tanks of the Asiatic Petroleum Company at Hong Kong. Whereupon the lid blew off at No. 26 Broadway, the American oil companies taking the position that while they were prepared to make any sacrifice necessary to win the war, it could only be with the understanding that similar sacrifice in similar degree was being and would be made by its associates in the war, and that before any further American tonnage, even if available, was applied on the war routes, the necessity for the continued application of British tonnage on the long and protected hauls from the Far East should be clearly demonstrated.

It is not the purpose of this paper either to substantiate or to defend the correctness of this view, but merely to state as accurately as possible what the feeling was. The British authorities on the other hand stoutly denied the implication of discrimination against American ships, or of preference to British ships. They took the position that assignment to service on the eastern trade routes was, in general, dictated by considerations of size, familiarity with trade routes and, sometimes, peculiarities of design, while the necessity of maintaining the production of the Asiatic producing fields at maximum capacity was dictated primarily by considerations of a military character such as the necessity of maintaining shipments of toluol-benzine to southern France, pos-

sible failure of the Mexican producing fields, and uncertainties as to whether aviation naptha of specifications equivalent to that of Sumatra naptha could be manufactured on a quantity basis in the United States. To these were added considerations of a political character. It did not seem to the British authorities that the tonnage savings that might accrue would compensate for the danger involved of setting fire to inflammable political material in areas none too stable at best. There was also the danger of political complications with Holland.

The so-called Eastern Agreement, negotiated as an agreement between the British and American Governments, by Sir John Cadman for Great Britain, and the American Petroleum Mission in London for the United States, upon the express authority of President Wilson through the intercession of Mark L. Requa, head of the oil division of the United States Fuel Administration, had for its purpose: (1) terminating the disagreements of a commercial character above described in the interest of international comity; (2) making permanent provision for the necessary deliveries of kerosene oil in the Far East with the minimum amount of tank tonnage. The outstanding features of the agreement, which was about to be given practical effect when the Armistice was signed and which may well serve as the basis of future agreements of similar character, were:

(1.) The whole volume of products to be delivered in the Far East during 1919, to be determined jointly by the British and American Governments and to be based tentatively on the whole volume delivered during the year 1917.

(2.) The agreed volume of products to be apportioned between the respective British and American interests in each area according to the percentage of trade enjoyed by each during the year 1913, when the operations of the respective companies were not impeded by transportational difficulties arising out of the requisition of ships.

(3.) Each consuming center to be served as far as possible from the nearest source of supply.

The territory covered by the agreement included Japan, North and South China, the Philippines, Indo-China, Siam, Straits Settlements, India and Egypt—in short the entire territory east of Suez, except Australia and New Zealand.

Referring to Item (1), the whole requirement of petroleum products, mostly kerosene oil, during 1917, was about 1,900,000

tons, this being about 300,000 tons less than the consumptions during 1913.

Referring to Item (2), the percentage distribution of trade as between British and American interests, based upon the attested statements of the companies was:

	Standard Oil of New York	*Royal Dutch Shell*
(a) In Japan, North and South China	63.8%	36.2%
(b) In India, The Straits Settlements, etc.	27.0%	73.0%
(c) In the Entire Eastern Trade	47.35%	52.65%

Referring to Item (3), the collective capacity of the so-called eastern producing fields: namely, Egypt, Persia, Burmah, Borneo and Sumatra, approximated 900,000 tons. This, on the principle of the shortest haul, would be delivered into India and the Straits Settlements and Siam, leaving a balance of 1,000,000 tons for delivery from the United States to Japan, North and South China.

There was released to trans-Atlantic war service as the result of the re-routings above described 60,000 tons of cargo carrying-capacity, sufficient to balance the tonnage deficit there existing as shown by the master statement of the preceding chapter and, in consequence, to compose the tank steamer position for the remainder of the war, an advantage overshadowing every possible disadvantage. The savings have reference to the distribution of British tank tonnage of July, 1918.

The estimate of the probable effect of the agreement upon the postwar fortunes of the two interested companies is in order as illustrating where war agreements may lead. From the British viewpoint, the fact that there was a trans-Atlantic tonnage gain connoted a financial gain. That the financial gain did not accrue to the particular American company involved was, in a national sense, immaterial, especially as the proposals were entirely of American origin. The British seemed to overlook the fact that the tank steamer program of the Emergency Fleet Corporation could not and did not begin to get afloat until 1919. The condition to be faced, meanwhile, of vital importance to England was that of increased consumptions on the one hand and of further reductions in available tonnage through sinkings, breakdowns in continued war service, etc., on the other. The correction of this condition was not a matter expressible in terms of dollars and the advantage was all to England.

In the matter of postwar trade the effects were, in general, favorable to the English interest also, rather than to the American. This judgment is based upon consideration of the following: (1) that the lowest grade of kerosene oil produced in the United States is equal to or superior to the highest grade of kerosene produced in the eastern producing fields; (2) that the accepted business basis of the East is quality, or "Chop," civilization itself, that is light, heat, power and food, being expressed in terms of kerosene oil.

The first and immediate effect of delivering all the high grade American products into Japan, North and South China, for redelivery in trade containers, was to improve the average quality of products delivered in British containers in the area in which their percentage of total trade was low. Conversely, the effect of delivering all the low grade eastern products into India, Straits Settlements and Siam operated to impair the quality of products in American containers; that is, to further depress American trade in the areas in which its percentage of trade was low. The advantage was to the British in each area.

Supplementary to the above, British interests secured a complete market for their entire eastern production—naptha, kerosene and by-products—together with protection under a former pool board agreement of its pre-war percentage of trade in the United Kingdom. They secured, incidentally, the support of the American Government in securing the casing material necessary to carry out the project which, in time, would lead to the complete reorganization of the eastern producing fields for maximum effort to be applied in any direction expedient after the war. The very least that can and should be said is that the voluntary sacrifice of postwar trade position in the sole interest of winning the war, coupled with the position previously taken with respect to its British flag fleet, was an example of handsome vision that does great credit to the Standard Oil Company of New York.

6. War Problems of the American Petroleum Industry

In a broad sense the problem of the American petroleum industry, when its support had been officially declared as vital to the further prosecution of the war, was triple in character. Briefly, it had regard to making the trade adjustments necessary to apply:

(1) the maximum possible amount of tank tonnage on the war routes; (2) the output of the Gulf and Atlantic Seaboard refineries against the war requirement in Europe; (3) the output of the West Coast and Mid-Continent refineries against essential war requirements in the Pacific area, and against domestic requirements in the United States.

The first and second of the above were arranged through the agency of the Petroleum War Service Committee of the Council of National Defense, a committee composed of the executive heads of the principal oil companies in the United States. The third was composed through the agency of the Oil Division of the Fuel Administration, which, under the direction of Mark L. Requa, was set up in Washington in accordance with the provisions of the Lever Act, assuming executive control over production, tank car and pipe-line deliveries in the United States.

The administrative problem attaching to petroleum matters as a whole was considerably simplified in 1918 by the fact that the then established American oil companies controlled at least eighty-five per cent of the total business. The dictum of the Petroleum War Service Committee was, therefore, practically final. The Oil Division of the Fuel Administration was free to act largely through that committee, and to exercise its own powers, which were very inclusive, only upon the well meaning but sometimes eccentric independent producer.

The final distribution of American tank tonnage reached, after consideration of every factor involved, is set forth in the table. Study of this distribution sheet is an essential preliminary to understanding of the whole tank tonnage question as showing the lanes which must be protected against submarine attack in future wars.

Next in order for digest is the analysis sheet by means of which the tonnage necessary to support the operations of the Gulf and Seaboard refineries was determined to the satisfaction of the responsible executive heads of the industry. This also, though highly technical in character, is of large professional interest as showing the method of reaching a conclusion of value on a question of this character.

This statement shows that although there were sixty-nine tank steamers engaged in the Mexican Gulf and Atlantic coasting service, the war refineries were still short by 50,000 gross tons of

DISTRIBUTION OF TANK TONNAGE FLYING AMERICAN FLAG
July 15, 1920.
Return by U. S. Shipping Board

SUMMARY

No.	Service	Ships	Gross	D.W.	
2	U. S. Navy	11	68,376	106,080	
3	U. S. Army	4	17,412	25,067	
4	Tenders Brit. Fleet	2	5,071	8,000	
5-6	U. S.—U. K.	12	55,792	84,173	
7-8	U. S.—Italy	9	50,336	73,270	
20	U. S.—Italy repairing	1	4,170	6,000	
9-10	U. S.—France	14	75,875	111,670	
20	U. S.—France repairing	1	3,476	5,000	
		54	280,508	419,260	32.00%
11	Molasses	5	25,328	35,100	2.68%
12	Atlantic Coasting	39	229,534	354,673	
13	Mex. to U.S.—West Indies and Central America	2	6,136	9,546	
14	Mexico—U. S.	30	172,418	254,833	
15	Mexico—Panama Canal	1	4,188	6,560	
		72	412,276	607,612	46.38%
16	California—Far East	2	16,437	24,820	
17	Nitrate	7	46,501	71,015	
18	California—U. S. Atlantic	1	7,150	10,475	
19	Pacific Coast and Hawaii	16	65,818	96,712	
		26	125,906	203,022	15.49%
20	Repairing (other than intended trans-atlantic)	7	30,053	44,988	3.43%
		164	874,071	1,309,982	
21	New Steamers expected ready by August 15, 1918	3	20,372	27,720	
		167	894,443	1,337,702	

STATEMENT SHOWING TANK STEAMER TONNAGE NECESSARY TO OPERATE GULF AND ATLANTIC SEABOARD REFINERIES AS ON JANUARY 1, 1918, PRODUCING 118,288,105 BARRELS PETROLEUM PRODUCTS ANNUALLY

I.	CRUDE OIL MOVING INTO GULF SEABOARD REFINERIES	
	Daily refinery runs	179,300 bbls.
	Maximum daily pipe line capacity	151,800 bbls.
	Balance to be brought from Mexico by tanker	27,500 bbls.
	At 6.7 bbls. to the ton this equals	4,104 tons
	At 30.5 days to the month equals per month	125,172 tons
	(a) Of this moved to Texas ports per month	59,160 tons
	(b) And moved to New Orleans	66,032 tons
	(c) Brought direct to consumers at Texas ports by boat	76,223 tons
	(d) Similarly to New Orleans by boat	1,866 tons
	(e) Florida East Coast Railway	27,347 tons
	(f) Total Crude to be Moved by Boat from Mexico per Month	230,628 tons
	Gross tanker tonnage required to move 135,383 tons of oil per month as per (a) and (c) based on voyage of 8 days or 40 trips per annum	27,077 tons
	Gross tonnage required to move 95,245 tons of oil per month as per (b), (d) and (e) based on voyage of 10.5 days or 30 trips per annum	25,399 tons
	Total Tank Tonnage to Move 230,628 Tons per Month	52,476 G.R.T.
II.	REFINED PRODUCTS MOVING OUT OF GULF SEABOARD REFINERIES	
	Daily Crude run 179,300 bbls. × 30.5 days per month	5,468,650 bbls.
	Less for refinery fuel 9,000 bbls. per day × 30.5	274,500
	Leaves	5,194,150
	Less 3%	155,825
	Leaves Balance	5,038,325
	Less 12½% to be moved by tank car	629,791
	Leaves Balance	4,408,534
	At 7 barrels per ton this equals per month	629,791 tons
	Less British Admiralty Fuel contract, Texas, Gulf & Sun Co. to be moved by British Boats	195,000 tons
	Less Italian Fuel Contract in Italian Boats	12,000 tons
	Leaves To Be Moved By Boat	422,791 tons
	Gross tanker tonnage to move 422,791 tons per month on voyage of 20 days	264,357 G.R.T.
III.	CRUDES TO REFINERIES AND CONSUMERS ON ATLANTIC SEABOARD	
	Daily refinery runs	154,800 bbls.
	Maximum pipe line capacity	125,000 bbls.
	Balance to be brought North by boat	29,800 bbls.
	At 6.7 barrels to ton equals per day	4,328 tons
	At 30.5 days per month equals	132,004 tons
	Of which quantity transported from Texas	40,970 tons
	And quantity transported from Mexico	91,034 tons
	Gross tanker tonnage required to move 40,970 tons per month on voyage 20 days	25,606 G.R.T.
	Gross tanker tonnage required to move 91,034 tons per month on voyage 21.3 days	60,688 G.R.T.

	Gross tanker tonnage to move 60,522 tons per month Pan American Mexico direct to Consumers	40,348 G.R.T.
	Total Gross Tanker Tonnage To Move 192,526 Tons Per Month	126,642 G.R.T.
IV.	Total Gross Tonnage Required as per I, II, and III	443,475 G.R.T.
	Tonnage in service January 1, 1918	344,286 G.R.T.
	Tonnage Deficit	99,189 G.R.T.
	Tonnage Deficit in Dead-Weight Tons	165,000 D.W.T.
	Tonnage Deficit to operate refineries to maximum capacity	219,989 G.R.T.
	Tonnage Deficit reduced to Dead-Weight	365,000 D.W.T.

shipping of the amount necessary to support the refinery output of January 1, 1918, and still further short in the amount necessary to operate those refineries at maximum capacity—which, having regard to the astounding rate of increase in war zone consumptions, was the only goal toward which the Petroleum War Service Committee could work. Incidentally, these statements show also that the enemy might easily have attained a major naval decision by submarine attacks simultaneously launched against tank steamers in the Florida Straits, and on the routes between Port Lobos, Port Arthur and New Orleans. The sweet little cherub sat up aloft keeping watch over the life of the poor Allies!

The total annual output of the Gulf and Seaboard refineries, namely, 118,000,000 bulk barrels, could be broken down roughly on the basis of fifty-five per cent fuel oil; twenty-five per cent gasoline; nine per cent kerosene, and seven per cent lubricating oil. Applying these percentages against the master statement of requirements previously presented, there was on totals, a very considerable excess of potential output above any possible requirement. This excess was, however, more apparent than real, because of the diversity in and rigidity of specifications.

The specification of fuel oil for the British Navy differed from that of the United States Navy. There were as many different specifications for gasoline as there were military units involved. In the case of lubricating oil, there were no less than forty-two varieties specified.

The specification for British Admiralty fuel oil was so rigid in character that a point was reached when the industry reported that it simply could not be manufactured in the quantity required to the specifications prescribed. The items of difficulty were viscosity and sulphur content. As to the former, the British authorities stated that, unfortunately, the Grand Fleet was operat-

ing in extremely cold water, and that the bunkers of their vessels were not provided with heating coils as were those of the American ships. It could not be expected that the Grand Fleet would suspend operations of war for dockyard installations of heating coils. As to sulphur content the claim was advanced that the extremely low smoke pipes of British cruisers and destroyers caused the gases to be swept aft asphyxiating the men on deck and below. In the end, however, the Admiralty was compelled to accept the United States naval specifications.

The conflict of opinion in respect to gasoline specifications was resolved through the agency of the Allied Specification Committee, a committee of experts which convened in Washington under the direction of Mr. Requa, and accomplished reduction in specification to two grades, that for motor transport use, and "fighting" spirit for aviation use.

How extremely uncertain the apparent excess of production at the refineries was is best illustrated by the fact that when it was finally decided to draw the requirements of aviation gasoline from the United States there were involved such extensive changes in refinery installations as to wipe out over night the excess of gasoline production formerly prevailing. This was the explanation of the "Gasolineless Sundays" sprung without warning in the United States. Had not the Armistice intervened, restrictions on the use of gasoline, especially in the Eastern States, would inevitably have become very rigid indeed.

Strange though it may be, no constructive effort exerted in the war was so little appreciated either at home or abroad as that of the National Petroleum War Service Committee. It is characteristic of all truly efficient bodies to function silently, but had this committee hesitated in decision or failed in performance, the war, if not actually lost, would at least have been indefinitely prolonged. As it was, no military undertaking of the Allies on the land or on the sea, underneath the sea or in the air was ever once interrupted through lack of petroleum supplies.

7. Post Armistice Adjustments

The Conclusion of the Armistice brought with it new problems both of supply and distribution. The first result was to increase rather than to reduce the consumptions of all products except

aviation naptha. The total consumption in the four months' period from December 1, 1918 to March 31, 1919 was, roughly, twenty-five per cent in excess of the estimates previously made for six months' consumption under war conditions.

The Armistice, viewed at that time, was only a phase of the war. Normally, that phase would be followed by peace. It might, however, be interrupted either by a resumption of hostilities or by the necessity of occupying the right bank of the Rhine in order to put an end to a state of anarchy that might develop to a dangerous degree in Germany. In any case, the only way of achieving peace was to be in a position to resume activities at any moment. It was, therefore, indispensable that all the organizations and machinery of supply that had been set up behind the armies in France should continue to act.

In addition, it was necessary to set up a new set of machinery to insure supplies: (1) to the army of occupation via Rotterdam, Mayence and Strasbourg; (2) to Belgium and the French population released in Alsace-Lorraine, and (3) in pursuance of Article 26 of the Conditions of the Armistice to provide, during the Armistice, for the provisioning of Germany to such an extent as might be deemed necessary. The supplementary problem was further complicated by the complete disorganization found to exist in the German railway system which necessitated transportation of the greater part of the supplies by motor lorry. The congestion on certain German railways was such that cars loaded with goods of various kinds extended without interruption for a distance of twenty-five miles. Three fifths of all the material moved in Germany immediately subsequent to the Armistice was moved by motor lorry. Offsetting all this was the fact that, the ocean lanes having been cleared of enemy submarines, ocean transport was free, and the war was over, let conditions on the land be what they might. The Armistice was signed on November 11. By December 1 all the British tank tonnage had been released from requisition and returned to its private owners, and by December 15, all the American tank tonnage was similarly released from requisition and the industry left free to reach a normal adjustment in its own way.

From the commercial viewpoint all that has been set down in the preceding chapters is over the dam and down the stream, mostly

forgotten in the march of subsequent events. From the military viewpoint the facts remain, not only as the record of war performance, but as the foundation upon which a study of the conditions likely to prevail in the future must rest.

Sufficient has been said to show that the problem is not merely one of deliveries against a prepared estimate of military or naval requirements. It involves consideration also of many factors: among them, stocks above ground, production, and the distribution thereof; refining capacity, and the distribution thereof in relation to producing fields; geographical location of the theater of war; maintenance of supplies to far eastern countries; requirements of essential war industries, domestic and foreign; essential war requirements of the merchant marine; transportation by land and sea. Each and all of the foregoing must be evaluated and evaluated correctly in terms of itself and in relation to the whole before any conclusions of value can be drawn.

The conditions change from month to month and year to year. Those of 1924 are entirely different from those of 1918. Those of 1925 may be different still. By vigilance alone can security be assured.

THE NAVY—A NATIONAL INVESTMENT

By Lieutenant Wallace S. Wharton, U. S. N. R. F.

MUCH has been said from time to time about the need for and the methods of "selling" the Navy to the American people, that is, to the people of the entire nation, be they residents of the coastal states or of the great commonwealths of the interior. There is no question as to the need for this "selling," for the present state of the Navy clearly demonstrates the fact that the future of the Navy cannot well be left to Congress, or to the efforts of the Department to convince Congress of the need for more adequate appropriations, both for maintenance and for a proper building program. Discussion of the methods of "selling" is, however, quite necessary.

The *genus politicus* sent to the halls of Congress nowadays is one that will listen to the voice of the people far more readily than he will to the advice of experts. This also was clearly shown during the last session of Congress.

To gain its end it is necessary that the Navy take its message and show its needs to the people. It is necessary that this message be so well delivered that the entire nation will realize that the Navy is an asset and that it must be continued in a state of high efficiency.

When this is done, and only then, will Congress pay attention to these needs, for Congress always has its ear to the ground to ascertain from which direction votes will be coming. When the people of the nation in their several congressional districts begin to make it known that they want a Navy that is second to none in quality and that is up to the quota allowed by the Limitation of Armament Treaty, then will Congress act.

At present there is a great amount of pacifist propaganda going about. Every effort is being made to have the United States take the lead in all manner of beautiful and theoretical ways to bring war to an end; ways and methods that show the complete

ignorance of the proponents of these schemes as to human nature or to the part that human nature plays in international affairs.

One of the schemes presented to members of Congress by the lobby of pacifists was to have the United States take the lead by abolishing both the Army and Navy, thereby setting an example for the rest of the world and shaming other nations into following the example. The advocates of this plan failed to explain why Germany did not abide by her treaties that were in effect before the World War, treaties that would at least have saved Belgium from spoliation had they been carried out either in letter or spirit. They failed to understand how any nation could be so low-minded as not to see the spirit of the example the United States would set by this disarmament and do likewise, instead of taking advantage of such a weakness.

An effort was made by one congressman to show these lobbyists, both of whom were exceedingly good looking women, that Mexico, a small nation, had been bold enough to invade American territory even when our Army was much larger; that China, practically disarmed and defenseless, has been the open prey for the nations of Europe and many other examples of how high-minded the nations of the world are about taking advantage of such opportunities. The arguments presented against disarmament met with polite silence, but by no means convinced either of the fair lobbyists of the error of the policy they were attempting to have adopted. Such people are not open to conviction, though they should be. This is merely an example of the work being done by the pacifists to gain their end, an end that is most meritorious if it could be accomplished, but which is impossible until human nature, which has remained fairly constant for at least 5,000 years, is materially altered.

A great deal to counteract this propaganda was done by the publicity attendant on the statements of Admiral Coontz in his report on the winter manuevers, 1924, as to the weakness of the United States fleet. It brought the fact home to the people of the nation that there was a weakness in our line of defense and converted many citizens, who were more or less indifferent as to the condition of the Navy, into interested Americans demanding the reasons why such a state of affairs has been allowed to develop. Such interests must be maintained and the Navy is for-

tunate in that by the exercise of proper tactics this interest can be maintained.

The maintenance of a Navy, or of any other institution, costs money and that money must be provided by the people, through taxation. True, this statement is a platitude, but it must be borne in mind at all times and the people be made to see that money spent on the Navy is a form of investment, the returns of which far exceed the expenditures.

It is an established fact that people will part with their money cheerfully, if such is ever done, only when they are convinced that the expenditures will bring returns commensurate with the amount paid out. This is true whether the expenditure is made for a concrete purpose or for something that is in the abstract, but the money is parted with far more readily if the payer can be shown that the returns will be real and concrete and that he will benefit by the expenditure.

The purchase of a house and lot or of a motor car is obviously justified by the returns received. Gifts for charity are made with the idea of purchasing security, as well as for the purpose of affording relief from suffering, for everyone knows that a person in dire need will not hesitate to purloin the property of others if it is a case of starvation or thieving. Other expenditures are made with the same purpose, that of acquiring a benefit.

All of this has a direct bearing on the business of "selling" the Navy, for the people of the nation must be shown that in return for their tax money, given over to the support of the Navy, they receive benefits equal to, or greater than, the amount so expended.

No institution can exist, or will exist, if its only claim for existence is that of glory. The Navy as a navy cannot and will not continue to exist when its usefulness is over and when its claim to appropriations from the Treasury is that of glory alone. The Navy must render service for the amount it receives and, further, it must show the people that it does render such service efficiently and economically. In this the Navy is fortunate for it does render service in peace time that far exceeds in value the appropriation allowed for its upkeep, in addition to being maintained as a machine for defense and an insurance against invasion in time of war. These things the Navy must show to the people, and show beyond a shadow of a doubt.

Navy enthusiasts, both in and out of the service, can do a great deal toward accomplishing this end by stopping their chatter about the glory of the Navy as the sole argument why it should exist and use concrete facts as to what the Navy does for the nation as a whole during the piping times of peace as well as in war. The argument must veer into channels that will bring the people to see that the Navy does make returns for the money spent in its behalf. This can be and must be done.

The popularity of life insurance is an example of what can be done in the matter of selling a "future" return. When first introduced, life insurance met with little favor because the purchaser could not see how he was going to benefit by the expenditure made. That was the very first argument the life insurance agent met when he attempted to write a policy in the early days of the business. By means of education the public was made to see the value of life insurance as a means of providing for beloved survivors, and also as a means of the policy holder's establishing a financial standing in the community. The owner of a policy not only gave his dependents protection against his death, but discovered that banks would readily loan money on insurance policies as security. The business was furthered by the introduction of many other features, such as endowment policies, accident policies, health policies, travel policies and finally by dividends until the public now acknowledges the value of life insurance without a question.

The justification of the Navy on its war value alone is very much like the argument for insurance. It is a form of national insurance against the invasion of a hostile force with the attendant destruction of national wealth and resources. This method of "selling" the Navy has been well developed in the past few years, and the World War did much in the way of convincing the people of the need of a Navy for such emergencies. The people were made to realize, by actual experience, that had not the British Navy been between this country and Germany we should have been in dire straits as our own Navy was not strong enough at that time to meet such an enemy. This lesson, now that it has been learned, must not be allowed to slip the minds of the people or else it may have to be learned over again with tragic costs.

It is interesting in this connection to note that the cost of the

Navy for the year 1923 was $310,164,387.92; that the estimated cost in 1924 was $332,609,050 and that the estimated cost for the fiscal year of 1925 will be $302,815,050. In each of these years the cost of the Navy is less than one-tenth of one per cent of the national wealth, estimated at $350,000,000,000. Such insurance premiums could not be called costly.

However, the Navy need not base its "selling" talk solely on war time insurance, though that is the primary purpose of a navy, for one of the most fertile fields, and the one most commonly overlooked, is that of showing what the Navy does for the good of the nation during normal times. In this field the naval officer and man can do a great service, not only to the Navy but to the nation, by showing the splendid results of the Navy's work. This message must be taken into every county of the United States and clearly and forcefully brought to the attention of the people. It can best be done by the navy people themselves, but they must master the rudiments of the argument before hand so as to be ready. The farmer in South Dakota must be made to see that development of a seapower and foreign trade, twins that ever go hand in hand, will help his financial condition either directly, by aiding him to dispose of his crops in the foreign market, or indirectly, by making it possible to sell the other surplus products of this nation abroad and bring about greater prosperity.

Production in these days is given over to quantity production and through this method the cost of individual articles is greatly reduced by spreading overhead costs over a great number of articles. Take, for instance, a hair brush factory with a capacity of 150,000 brushes and a home market of, say, 90,000. The machinery in the plant and the operation of the machinery, by power and labor, cost approximately the same for the 90,000 brushes as for the 150,000. Of course, the material for the 60,000 additional brushes to bring the output up to the plant capacity will cost more, but this factor is negligible as compared with the power, labor and plant overhead charges. Suppose the cost of each brush when operating at an output of 90,000, is $3.00. Then, by means of securing a market abroad through development of sea power and foreign trade, the plant is able to operate at full capacity and dispose of its products. This will result in a lower cost for each individual brush because the plant overhead and other standing

charges are distributed over more items, and the cost of each brush drops to $1.80. This not only means that the farmer will be able to buy more brushes, but also that more men are given employment, which results in a greater purchasing power and is reflected in prosperity for the entire community. This is what happens when the foreign market is developed to take the surplus produce of a nation. The same applies to any and all produce. If it can be produced in quantity with a lower cost per item every buyer of that community in the nation profits thereby for he has more money with which to buy other articles. This is one of the things that must be developed in "selling" talks about the Navy; that the Navy fosters and aids sea power and foreign commerce through developing navigation and allied sciences and makes it possible to dispose of surplus produce in foreign markets with the results that purchasing power is greater and prosperity increases throughout the nation.

During 1923, a year that saw great prosperity in the nation at large despite poor conditions in certain localities, the foreign trade of the United States amounted to $7,959,884,334, of which $4,167,946,321 was exports and $3,791,938,013 was imports. This trade was made possible by the development of sea power and it can be increased by the further development of sea power and in sea power the efficiency of the Navy is an important factor. During this same year the cost of the Navy, given above, amounted to approximately four per cent of the total foreign trade. The return on the investment was one worthy of consideration and few business men would begrudge the money expended on such returns.

It must be shown whereby the farmer and the manufacturer in the interior, and in fact the entire population, profits by these things. When this is done and the part the Navy plays in this work is fully realized then the Navy will have no trouble whatsoever in obtaining funds for proper maintenance or a building program. These facts have been brought home to the British people and they take them for granted, so ingrained is the knowledge in their national outlook. The same can be, and must be, done for the American people, and the men of the Navy can do much in the dissemination of this information by means of speeches, informal talks, letters to home folks and through the medium of the press.

In addition to all of this the Navy can show accomplishments in the field of science that more than warrants its existence. Many of these things are confidential, but there are enough that are not to supply navy folk with material for showing the people that the Navy is not idle and unproductive during times of peace.

One of the greatest things the Navy has to talk about and to use in showing its value in peace times is the way it prepares its men for work in industrial fields ashore. The educational facilities of the Navy for teaching trades is unexcelled, for besides having the most modern appliances, the Navy offers the man a chance to attain mastery of his trade, travel and save money at the same time, a combination to be found nowhere else. Then, too, the character building attained by service in the Navy is something that can be pointed to with pride.

In short the navy man in "selling" the Navy can tell how the Navy has furthered the science of navigation by making accurate charts, keeping and checking astronomical data, development of sonic sounding, radio compasses, radio bearing stations, submarine signals and many other things that will come to mind when the navy man really starts listing the peace time accomplishments of his organization. He can tell how the Navy takes a boy who is unable, through lack of money, to carry on his education, trains him, builds up his character, allows him to see the world and then returns him to civilian life with a trade and the savings accumulated during his four-year enlistment.

There has been much talk of the economic waste of the Navy. Such statement, and the phrase, is merely the brain child of some inland politician who knows not whereof he speaks, but like all myths has gained a widespread circulation. The fact that this circulation has become so great is due partially to the fact that heretofore the navy men could not nail such lies to the mast because of the muzzle regulations which forbade writing or speaking in public without express approval of the Secretary of the Navy. By checking such misstatements the Navy may now do much to correct the false impression and it can be done first by showing that the Navy does give returns for the appropriations it receives from the Treasury and second by showing the figures quoted for the cost of maintaining the Navy are grossly exaggerated.

In the budget for the fiscal year of 1925 the director of the

budget prepared some very interesting tables concerning the cost of the Army and the Navy in relation to other federal expenditures. The figures given therein belie the statements so frequently heard that more than seventy per cent of the normal expenditures go for the maintenance of the Army and Navy and to pensioners.

The budget figures show that all military functions of the United States Government, for the year 1925, will cost but 37.32 per cent of the total expenditures; in other words for every dollar of federal taxes 37.32 cents will be set aside for military expenses. In the preparation of the costs of the military functions, national defense, military and naval pensions, retirement pay, annuities, World War allowances and life insurance claims were included. The tables go further and show that the Navy Department receives 9.23 cents out of every federal tax dollar and the War Department, including the Panama Canal, 11.15 cents. This makes a total of 20.38 cents of every tax dollar for the operation and maintenance of the Army and the Navy; quite different from the alleged seventy cents.

Of course, some of the pacifists argue that payments of interest and principal on the national debt should be counted as military costs. It is true that the major portion of the national indebtedness was caused by war, but who is to say that the wars fought by the United States were not justified? Who is to say that money paid a surgeon for the removal of a dangerous appendix is not well spent?

Summed up, "selling" talk for the Navy should be along lines that show the Navy gives returns for the money it receives; that it fosters and aids foreign commerce thereby bringing prosperity to the entire nation, that it enables the youth of the nation to obtain a trade education and to save money at the same time; that the Navy is excellent and cheap insurance in time of war and that the cost of the Navy in proportion to other federal expenses is not exorbitant, nor at all out of proportion to the returns made by the Navy to the nation.

When the people of the nation have been convinced that money spent on the Navy is an investment that brings good returns there will be plenty of "buyers" for the Navy, and then only will the Navy receive proper attention from the Congress.

THE FETISH OF FORMULAS

By Lieutenant Commander Oscar Smith, U. S. Navy

IN THE NAVY of the present day, are we not making a fetish of formulas? We are developing a rule for this and a method for that, reducing everything to a standard so that knowledge is easy to gain, inspections easily made, and administration easily accomplished.

Thus, we have established formulas and forms for the navigator so that his work at sea is simple, short and easy of accomplishment. For the chief engineer, complete and thorough instructions are issued by the Bureau of Engineering, covering such varied ground that, any man, by studying these instructions and carrying them out literally, need not call upon his own personal ability in order properly to perform his duties. Further, should any accident occur, the instructions are so multitudinous that it is almost a certainty that the bureau and administrative officers can point to some instruction which has been violated or forgotten, and thus the operating force must assume all the blame along with the responsibility. For the gunnery officer, the Bureau of Ordnance has compiled instructions and safety precautions which, if strictly followed, will prevent disaster. The fleet has devised check-off lists and standardized methods so that this work may be learned merely by study of past records.

Thus, due to the desire and need for standardized methods in our service, practically everything has been reduced to formulas. Unquestionably, there was urgent need for the introduction of standardization into engineering and ordnance. The spirit of competition which was engendered in the early years of this century by Admiral Sims and others, had started every officer to work along individual lines in order to improve our gunnery and our engineering economy. The result was immediate and marked improvement in both gunnery and engineering. After ten years, however, it was found that every graduate from the Academy was trying out the same old schemes which had proven of no value

many times before. Therefore, about 1914, the fleet started to standardize methods and materials in order to reduce this waste of effort.

This period of standardization has lasted ten years. During this time both gunnery and engineering probably have reached their highest levels of attainment, excepting as occasional improvement in material offers a slight advantage. By reference to reports of target practice, ship and gun drills, and records of individual ships, broadside, turret and gunnery officers are able to learn a great deal about their jobs, what the best methods are, etc., and as the result the fleet in its entirety has advanced and improved to the level of standards set.

All these standards, formulas and instructions have made our work easy. They have served a necessary and very useful purpose. We should consider seriously if they have not fully served their purpose, and are not now acting as drawbacks against our further improvement. This is caused by the fact that, unfortunately, due to the difficulty of enforcing standardized methods upon our service, which had developed from 1904 to 1914 on individual lines, strict disciplinary measures were taken to assure close obedience to standards and instructions. Check-off lists, written instructions, long preparedness questions and lengthy reports were devised so that every officer was compelled to abide by the standard methods. Therefore, at the present time the abilities of such officers as might improve our methods are severely cramped and they are prevented from utilizing their abilities for the improvement of the service without danger of ruining themselves and their careers, by wrecking themselves during a quarterly battle efficiency or preparedness inspection.

This subject opens up many trains of thought and many lines of argument. Some officers will see in this step a retrograde movement, back to the conditions of 1904. Others will see in it the possibility of advance in the future, and will approve, with the idea of throwing off all standards and letting individual effort remain unhampered for all time. Common sense indicates that neither of these courses is best for the service. We must use our present standards and our past experience as the foundation for our future development. If we base decision on anything except this basis, we shall discard the advance we have made and consolidated in-

stead of using it for further progress. Therefore our plan is to simplify present instructions, orders and methods into some permanent form such as will prevent repetition of former errors and furnish the service with a good working platform, and then to encourage individual action and initiative for improvement of methods above our present standards.

But, many readers will immediately say, this is exactly what we are doing at present. Such a statement, however, is thoughtless and can not be based on sound observation of present conditions. The practice of engineering and gunnery in the fleet, particularly as regards methods of operation, is restricted to close limits by the questions asked in the voluminous quarterly inspection and preparedness reports. The questions in these reports, running into the hundreds, have in great part outworn their usefulness, as they have fulfilled the purpose for which they were created by firmly establishing methods of operation and now merely serve to prevent improvement above those standards. As long as they are used as a club to prevent adoption of all methods which are a departure from present standards they will kill the initiative of the heads of departments concerned and prevent developments and improvements which are vitally necessary.

Investigations of failure at target practice, which it may be assumed were originated in order to make sure that standard methods were being followed as well as to determine the immediate cause of any failure, have also become threats against every officer and man connected with the investigation, and each member of the personnel concerned sees therein only an attempt to place the blame upon him, instead of a praiseworthy effort on the part of the higher command to assist him in locating the faults so that they may be corrected in the next period of competition. This feeling must be changed.

Consideration of the reaction of the questions and investigations upon the vast majority of officers forces us to admit that most officers, as a result of them, take the safe path of standardized mediocrity. That is, they use methods which are almost certain to give an average good multiple; something strictly in accordance with standards; something slightly above the mark for which they will be investigated; something which will keep their records clean and, needless to state, something well below the maximum which they could obtain were they to make the hazard of trial and at-

tempt, by full development of their own personalities, to deliver the best they have in them.

There is a further reaction in all this which militates against the efficiency of the naval service. By too close adherence to set rules, regulations and standards, our freedom of thought and initiative become stunted and warped, so that when we have spent thirty or forty years in the service and have reached the higher ranks we are unable to think and act quickly upon new and unforeseen conditions, but are compelled by our previous mode of life to remain on a standard mediocre plane of development. History records time and time again that the great generals and the great admirals were those who retained their temperament for individual, independent and extraordinary action. This is particularly true in naval warfare. Nelson, by his independent action off Cape St. Vincent, by his perseverance at Copenhagen and during the long years of the blockade, and by his disregard of the old regulations, that "the fleet should be joined in action van to van, center to center, and rear to rear," was able to accomplish more for England than all the hosts of standardized sailors who came before and after his time. In fact, no small measure of his success was due to the fact that his opponents held closely to the orthodox, mediocre methods of the times, which ordinarily gave a slight amount of success, and were supposed to be safe and sane. Such action furnishes an alibi—but not victory.

The time has not yet come, and the development of airplanes, submarines and numerous other auxiliaries indicates that the time will never come, when naval warfare will not be subject to the hazards of sea and weather. All these factors make it more essential that the higher command be versatile, bold, ready to take the initiative, and to authorize new and unexpected movements when the opportunity arises. He must know when caution is necessary and when it must be thrown to the winds; when to retreat and when to advance, and more, he must be able to take such action at the psychological moment. If he has spent a lifetime of standardized living, of keeping out of trouble and never allowing himself his own full development, it will be impossible for him to throw off the shackles from his mind when this time comes.

The inability of the military mind (by which is meant the minds

of generals and admirals with years of discipline and regulations) to grasp new conditions and to rise to the highest demands of modern warfare is illustrated in a letter from Winston Churchill, written to the British premier a short time before the battles of Wytschaete and Messines, in the latter part of 1914. At this time, Allied and German Armies were stalemated and had dug into their intrenchments from the Swiss border to the North Sea. Mr. Churchill, with other free untrammeled minds, was of the opinion that with the present equipment nothing could be gained on that front, and that either new equipment must be devised or the next move made upon another front. He stated, however, that unquestionably, "the military mind would not be satisfied that this condition of stalemate was true until it had sacrificed hundreds of thousands of lives to prove the fact." Numerous small local battles and the millions of lives lost on this front from 1915 to 1918 indicate how true his estimate was and that years of discipline and standard living had imposed on military minds an inability to perceive true conditions that were so apparent to a tyro.

Read the story of the opposition by the military minds to tanks, smoke screens and every new form of warfare developed by modern science, and the fact that such a mental condition develops is unmistakable. It developed in the British. It controlled the Germans. It almost ruined the French. Fortunately, we were not put to the test.

But it does appear that our service is liable to drift into this condition during these years of peace. Formulas and instructions are devised with the intent and purpose of making things easy for us. It seems proper for us to stop and consider the fact that men do not advance, and nations do not progress, when things are made easy. What we need is an incentive to drive us ahead, with rewards for every success. Let us not stop where we are, nor be content with whatever we have gained in the past; let us not remain bound by methods which may be improved; let us not make a fetish of formulas, but, taking full advantage of our present position, let us have a period of mental development and individual effort. Withdraw the threat that one mistake, no matter how small, will ruin our careers; that he who makes no effort but follows the rules will become an admiral, while he who tries and makes a

partial failure, is ruined for life. The Wrights did not conquer the air on a series of successes but by overcoming repeated failures. Langley's failure did more for the success of aviation than had he never tried. We cannot deliver our full abilities nor properly serve our country if we are restricted too closely by rules and methods; therefore, let us have a period of freedom, that our minds may expand and develop to their maximum, for the sake of the service and the glory of our country.

THE ORIGIN OF NAVAL LAW

By Lieutenant W. J. Nunnally, Jr., U. S. Navy

THE WRITER had occasion, in the collection of certain data for a purpose in no wise connected with its use in an article of this nature, to examine various authorities upon this subject. The most interesting discovery in connection with this task of delving through numerous volumes, some of extremely ancient vintage, was that early naval law was not based upon the military law of the land but that it did, in fact, precede such law by several centuries. Attributing the basis of naval law, as we recognize it in our service today, to the military law results from the fact that the Army is the older service. Inasmuch as this subject antedates the time when "the memory of man runneth not to the contrary," it is hardly necessary to disavow any originality or to admit that the writer relied upon certain recognized authorities; nevertheless, he frankly does both.

All history commences with myth, goes from myth to fable, thence to folk-lore or tribe-lore, until it reaches, eventually, what we recognize as an authentic stage. Just so in the consideration of the subject of naval law "we have an account in the Fabulous Times that the Titans, being vanquished, the Brother-Gods, Jupiter, Pluto, and Neptune shared by lot the Dominion of the Universe amongst themselves. Heaven fell to Jupiter, Hell to Pluto, and the Sea to Neptune." The teachings of some of the ancients, however, show that the truth thus hidden in fables was that Jupiter, Pluto, and Neptune were not gods but men. According to these teachings Jupiter was the ruler of the Dominions of the East, where the sun rises, seemingly the higher part or Heaven; Pluto was ruler of the Dominions of the West, where the sun goes down, hence the lower part or Hell, and Neptune was the sovereign of the sea and its islands.

Historical authority for this early *tri-parte* division of the universe is to be found in Lactantius' *De Falsa Religione,* wherein concerning the dominions over which Neptune ruled: "'Tis evi-

dent that 'twas much like that unlimited command, which by decree of the Roman Senate was given to Cneius Pompeius, who thereby had authority over the sea and all its coasts, from whence he was to banish pirates." From the mythical through the ancient and down to the modern times various countries and monarchs claimed dominion of the sea and actually did maintain sovereignty of the seas, or at least over such parts as their ships frequented.

First of these monarchs was Minos, King of Crete, supposed to have been the grandson of Jupiter, who, in the time of the judges of Israel, ruled over all the Cretan and the greater part of the Ægean Sea as sovereign lord. It is quite probable that he exercised this sovereignty by right of conquest. Plato has attributed to Minos the *Sea Laws of the Cretans*. These sea laws of Minos were the foundation of Plato's laws. (Although some of the later writers question the authenticity of the sovereignty reputed to have been exercised by Minos and his promulgation of sea laws, Plato is sufficient authority to give them credence in the absence of proof to the contrary.)

After the Cretans the Lydians exercised dominion over the seas for about one hundred years, then the Pelasgi were rulers of the seas for about fifty years, during the days of Solomon. The Thracians followed the Pelasgi in the time of King Jeroboam. The Rhodians followed the Thracians during the reign of Jehosophat.

After the rule of Minos there is no account of further development of sea laws until the naval laws of the Rhodians. In fact the fame of the Rhodians may be attributed to their naval laws and not to their naval power or supremacy. Other nations no doubt did control, after a fashion, seafarers, but they were recognized only according to the actual strength they exercised at sea. Each king attempted to make the sea an integral part of his kingdom, apparently extending the laws of the land to the sea. Minos may possibly have been the single exception.

The Rhodian naval laws, however, are the most ancient now in existence. These people must certainly be credited with the first maritime code. These laws were in force among the Romans from the time of the Emperor Tiberius. The Emperor Antonius directed that Endaemon's petition be decided according to the *Law of the Rhodians,* and Justinian, 483-565 A. D., incorporated the Rhodian laws into the Roman digest.

The Rhodian control over the sea must have been about two hundred years before the founding of Rome. There is no mention of any further sea laws until the Rhodian laws were added to from time to time by the cities and provinces of Italy. They were revised and added to by the Emperor of Rome in 1075 A. D., and by cities and other authorities as noted: Marseilles, 1162; Genoa, 1186; Venice, 1215; Constantinople, 1262; Constantine, 1270; Peter of Aragon, 1340; Barcelona, 1434. This collection of laws served the Mediterranean for hundreds of years.

The first laws on the Atlantic were promulgated by Richard I of England, who established the *Maritime Laws of Oleron* upon his arrival at the Island of Oleron on the French Coast, on his return from a crusade to the Holy Land. The *Laws of Oleron* decreed that the master of the ship should keep peace among the seamen and be as their judge at sea.

From the time of Richard I, the *Laws of Oleron* governed the Atlantic just as the Rhodian laws governed the Mediterranean. In 1375 Edward III of England issued articles concerning the admiralty and seafaring, and in 1561 Frederick II of Denmark set down a revision of the *Laws of Oleron*. Notwithstanding these statutes and revisions certain of the Rhodian laws are today recognized among the nations throughout Europe.

At the beginning of the Roman Empire a special distinction existed between persons to whom the charge of shipping was given and those to whom the command of fleets and navies was committed, and between persons who exercised jurisdiction over controversies. Governors of fleets were called archigubernii. Later, during the seat of the Empire at Constantinople, the title was changed to admiratus from the Sarazen word amiras, meaning overseer. Then the title was again changed to great admiral, whence came our present designation of admiral. The captain of a ship was designated by Roman law, *magister navis;* by the Dutch, skipper. The captain was from earliest days charged with responsibilities. The whole power and charge of the ship was committed to him. This power was prescribed partly by the owner and partly by the common law of the sea. The ships serving the country or the prince were from earliest times privileged ships.

Exercise of justice among seafaring men among the Romans was at first under jurisdiction of *magisteriani* who were accountable

to *Praefectus Praetoris Sublissimus* from whom there was no appeal. Later, for the readier obedience to the admiral of the sea, he was given sovereign jurisdiction over all seafaring men within his bounds (this was apparently done by some form of common consent of nations) and over all seafaring causes and controversies, both civil and criminal. This authority was generally established in Europe early in the sixteenth century. It is to be noted that this system has developed into the Admiralty Courts of today.

The first organized English Fleet appeared in 876 under Alfred to meet the Danes at sea, but from the time of William the Conqueror for nearly two hundred years England's Navy was composed of merchant ships of the Cinque Ports. It was not until the latter part of the fifteenth century that the man-of-war appeared, and with it the military officer afloat who was succeeded by the naval officer combining the functions of military officer and of mariner.

Richard I, in 1190, established the first laws and ordinances for the regulation and government of his navy, which consisted of the heterogeneous fleet of the Crusades, composed of ships drawn from all the ports of the kingdom. These regulations provided especially for the punishment of offenses against life and property. Here we find special ships and special regulations, a combination of both admiralty and naval laws, the foundation of the present day Navy Regulations.

Under King John, who died in 1216, was created the first naval administration of England with establishment of an office called the "keeper of the king's ships"—later designated "clerk of the king's ships." His authority was preeminent until the establishment of the navy board in 1546.

The *Black Book of the Admiralty* contains a treatise on the office and duties of the admiral compiled prior to the year 1351. He was to administer justice "according to law and ancient custom of the sea." This document goes on to recite "the ordinance how the admiral himself should rule and govern by sea and land in the country of the enemy, if he come there." No seaman was to be beaten or ill-used, but offenders were to be brought by the captain or master to the admiral to be dealt with according to the law of the sea. In the reign of Edward III, 1337, the king's council gave

directions to Sir John Roos, admiral. The king and his council managed the navy, leaving the details to the admiral. The admiral held courts of admiralty, administered the ancient maritime law and punished offenders "according to the custom of mariners." Captains of ships, unless they had received explicit authority to do so, were not permitted to punish seamen, but it appears that authority was often so granted. Death penalty, by hanging, was prescribed in case of conviction by a jury of twelve persons (the authorities do not prescribe the particular qualifications of these jurors) for theft of a buoy rope fastened to an anchor, no matter what the value, and for the theft of an anchor or boat of the value of twenty-one pence. No lieutenant (presumably aide) of an admiral could, without special warrant, try matters affecting life and death. Offenders were to be imprisoned by masters or captains pending the acquaintance of the admiral or his lieutenant with the circumstances. (Commanding officers in our Navy are guided by this same procedure in all cases involving general court-martial today.)

Henry VIII, 1509-1547, ordered prepared an elaborate set of fleet regulations called *A Book of Orders by Sea and Land*. Prior to these regulations "different ships, different ways" applied in a great diversity of custom and regulation. With the promulgation of these regulations the Navy as an organization became a fixture in England. The lord high admiral, the "king's lieutenant of sea affairs," thereafter issued commissions to naval officers. The captain of a king's vessel (man-of-war) differed little, if any, however, from a captain of a merchant vessel. They were interchangeable. The difference between them was that the captain of a king's ship regarded the king and the "keeper of the king's ships" as sources of authority and himself as representative of that authority. In the year 1546 Henry VIII established the "Navy Board," which functioned somewhat similarly to our "General Board" today.

The first case of trial by court-martial for insubordination was in the year 1557. During Cromwell's Protectorate is the first record of a captain being court-martialed for the grounding of his ship, although she floated without damage. The first "Articles of War" constituting a code of discipline were enacted by Parliament in the year 1652.

Although the Royal Navy of England dates from the reign of Henry VIII as a direct result of his regulations, *A Book of Orders by Sea and Land,* yet he did not provide regulations for manning and disciplining his navy. James II established certain regulations for his navy governing the conduct of the commanding officers. William established more stringent regulations and included provisions for rates of pay. In the reign of Charles II two sets of orders were added: *General Instructions to all Commanding Officers* and *Orders Established for the Well-governing of His Majesty's Ships, and Preservation of Good Order Among the Respective Commanders, Officers and Seamen Serving His Majesty in the Same.* The Prince of Denmark, during his occupation of the office of lord high admiral, established certain regulations for the government of his navy. These regulations prescribed penalties for certain offenses. Punishment for "theft" and "sleeping on watch" was "according to the discretion of the commander." Court-martials in the royal navy were regulated by Act of Parliament during the reign of George II.

We see, therefore, that the powers exercised in the earliest times by both captains of ships serving nations and princes (public vessels) and masters of merchant vessels were later curbed to such extent that nearly all such powers were exercised by the admiral under the admiralty jurisdiction conferred upon him. Then follows a gradual restoration of the original power to captains of naval vessels (men-of-war) which reached its peak probably about the time of the Revolutionary War, as is clearly set forth by John Paul Jones in his report to the naval committee of the Continental Congress prescribing the proper qualifications of naval officers. "His (the commanding officer's) authority when off shore being necessarily absolute. . . . Force must be used sometimes for the ends of discipline. . . . A navy is essentially and necessarily aristocratic. . . . Whilst the ships sent forth by Congress may and must fight for the principles of human rights and republican freedom the ships themselves must be ruled and commanded at sea under a system of absolute despotism."

Our Navy Department was not established until April 30, 1798. Prior to that time the Navy was a part of the War Department and was governed primarily by the military laws of England which had been put into effect bodily in 1775. These military laws of

England, augmented somewhat by the common law and customs of the sea, governed until the Congress in 1862 enacted the *Articles for the Government of the Navy*. (It is interesting to note in this connection that although the Navy was merely a part of the War Department until 1798, yet, under the provisions of the Constitution of the United States adopted prior to 1790, Congress may legislate and provide for the maintenance of the Navy over a period of years, without limit, whereas they are prohibited from so providing for the Army for a longer term than two years.)

Just as the early despotic power of the commanding officer was restricted by the creation of the admiralty court presided over by the admiral, for the mutual protection of the commanding officer and the individual under his command, just so have the *Articles for the Government of the Navy* curbed the despotic powers which had been redelegated to the commanding officer during the period prior to the Revolutionary War, again for the mutual protection of the commanding officer and the individual serving under his command.

Naval law has been the outgrowth through the centuries of the application of the customs of the sea and the common law of the sea, as augmented and modified from time to time by regulations and statutes. The severity of its punishments has ever been in accord with the temper of the common law. As has been very aptly put by Harwood, "it neither takes the place of common law, nor releases the (naval) military community from the general operation of the law of the land. It imposes new obligations on those who fall within its jurisdiction, in addition to those which were previously required of them in their general quality of common citizens of a common state."

INDOCTRINATING CIVILIANS IN MATTERS OF NAVAL DEFENSE

By Lieutenant R. E. Daniels, U. S. Navy

THE RESPONSIBILITY for adequate prewar preparation does not rest altogether on our naval officers, for no matter how able they may be they can not "build bricks without straw." It is necessary for our civilian population to lend proper support, and in order to do this it is essential for our civilians to understand the nature of modern naval war and the requisites for its successful prosecution, for we are dependent on them not only for appropriations, but also for elements of preparation that fall within the field of diplomacy, such as, upholding our interests at limitation of armament conferences, securing the means for proper lines of communications, and other similar matters of diplomacy which are vital to us.

History would seem to indicate that in the past, due to our not having any powerful neighbors close at hand, our people have not fully appreciated their responsibilities in this matter, for our country has always been prone to be content with grossly inadequate preparation for national defense. In the War of 1812 the responsibility for national defense had been left to the militia of the various states, and as a result our poorly trained and badly handled forces were beaten in nearly every engagement and an enemy force of less than 5,000 men were able to wage war against a country of 7,000,000 for a period of two years. Even the national capitol was left undefended to be burned by a handful of British. The conduct of the war can only be viewed with humiliation, and the only redeeming feature was the victory at New Orleans after peace had been signed. In the wars in which we have been engaged between 1812 and the World War, we have had the good fortune to fight enemies as unprepared as ourselves and, though in each case our victories were bought much more dearly than if we had been prepared, still the consequences

were not as serious as they would have been had we been opposing a well organized enemy.

In the World War fortune was again with us, for our allies were able to keep the enemy occupied for a year while we were getting ready to fight. That they were able to do this by a slim margin was not due to any foresight on our part.

Is it reasonable to assume that fortunate circumstances will prevail once more in our next war? Of course some will say that the answer to this is, that there will not be another war, because the growth of liberalism and socialism throughout the world will prevent it. However, history does not bear out this idea, and, in fact it may be pointed out that the growth of liberalism in Germany was one of the very first things that forced Germany's hand in going to war. We have no assurance that a parallel situation may not develop in the national affairs of one of our potential enemies.

There are also those who think that it would be very difficult to force our country into war, and that it would only come about after years of arbitration. This is far from being true, for an enemy could force us into war on any day they may elect, by an attack on our distant insular possessions, justified by some trumped-up pretense. Should that day come, it is to be hoped that we are not confronted with the surprise of superior preparation silently carried on until all is ready for the decisive blow.

Adequate preparation is even more necessary in modern war then it was formerly, and it is especially necessary in a naval war, for the time required to prepare a navy is so great that it must almost be accepted as a fact that the navy which is beaten in preparation is already beaten before the outbreak of war.

At the present time, though it is only a few years since the World War, our people are little better off than they have been in the past in their understanding of the nature of modern war and the responsibilities in connection with national defense. The prevalent opinion among civilians is that war is largely a mere matter of brute force, redeemed to some extent by discipline, and that the outcome of a war will depend almost altogether on the relative resources of the contesting powers. People who are well informed in other matters hold the premise that eighteen battleships will surely be able to defeat and dominate the situation

against an enemy with an inferior number of battleships, irrespective of what distant part of the world the enemy may be based in, and no matter how tremendous the logistic problems involved or how vast the effort necessary to keep the lines of communication open for the passage of supplies. Many others will glibly say: "The Navy is a back number anyway; one airplane can easily sink a battleship with a single bomb." The reason for this regrettable lack of knowledge of the Navy and its problems is easily seen. Most people gain their total information on naval matters from pictures and articles in the "Sunday Supplements." These articles are written from the point of view of furnishing a conspicuous news story, and what little information is given in them is apt to be either untrue or so garbled as really to result in giving out misinformation.

In our universities the study of war is given the scantest consideration, except as it may come up in a history course, and then a war is considered from the point of view of a series of historical events and not as a consideration of the principles of warfare involved. Surely no branch of political science requires more careful consideration, and certainly in no other are the issues of more momentous importance.

Needless to say it is not thought that if naval matters were more generally understood our civilians would develop into Mahans. The Navy is, above all, a practical profession and the application of theory to practice can not be learned by those who have not served with the fleet. However, if the problems of naval defense were more generally and more thoroughly understood, the importance of readiness would be more fully appreciated and abuses would no longer be regarded with indifference. Also, it is thought that a nation that understood something about naval defense would hardly suffer the grotesque tricks that have so often been played on the Navy due to the vagaries and clouded preceptions of well-meaning statesmen; and perhaps in time even statesmen themselves would realize that when national defense is the issue, political "log rolling" must give way to sound preparation, and that, insofar as possible, diplomacy and strategy should keep step.

Coming now to a consideration of the various means at our disposal for the education of the American people to a better

understanding of naval defense, several possibilities suggest themselves:

(1) A short while ago one of our flag officers made a speech at a banquet on some subject in connection with naval affairs, which, I am told, was broadcasted by radio telephone. This would seem to be an educational medium of great possibilities, of which the Navy might take a little fuller advantage.

(2) From time to time the matter of establishing naval training units at some of our large universities comes up and I think most of us would be glad to see this accomplished. If these units are established, might it not be worth while to have some part of the time of the unit devoted to the study of naval history? Might it not be possible for the officer in charge to accomplish a great deal in the way of promoting a better understanding of the problems of naval defense which confront our country? Of course such pursuits would not particularly add to the efficiency of the reserve unit should it be called upon at some time to serve with the regular establishment, but it is a question if the Navy is not more in need of well informed civilian friends than it is of partially trained reserve officers, and in any case the time taken from more practical branches of the training would be small.

(3) Again, in the case of the naval reserve officers who put in a short cruise each year, are we doing all we can to make of them as intelligent and well informed advocates of proper naval preparation as we might?

(4) Recent press notices would seem to indicate that there is some likelihood that a school will be established for the training of men just entering the diplomatic service. If this becomes an established fact, should not the curriculum of the school include the study of naval affairs, preferably under the guidance of a graduate of the Naval War College? As it has been said before, not with the idea of producing any young Mahans, but with the mission of impressing on them the paramount necessity for a close concert between naval strategy and diplomacy.

(5) Would it not be profitable each year for several of the officers of the diplomatic service to take the course at the Naval War College? Each year several army officers attend the class, and, on the other hand, several naval officers attend the Army War College. The idea of this exchange is to promote coordina-

tion between the two services, and it is felt that this arrangement is very desirable. The necessity for coordination between the diplomatic service and the Navy is just as vital as the need for coordination between the Army and the Navy, and probably more necesary during times of peace.

In conclusion it may be said that it is realized that these suggestions are far from being comprehensive, and that perhaps none of them is feasible for one reason or another. Only one virtue is claimed for them, and that is that it is thought they are at least concrete and definite. Other and more comprehensive methods of furthering the same ends no doubt suggest themselves to officers of longer service than the writer, for I think we must all realize that with the present outlook it is high time the Navy had more and better informed civilian friends.

DISCUSSION

Breaking Ice in Baltimore Harbor

(See page 1304, August, 1924, PROCEEDINGS)

LIEUTENANT COMMANDER FRANK LUCKEL, U. S. NAVY.—Captain Dismukes' very interesting and instructive article indicates that a battleship can break up ice "four or five feet thick." The thickness of ice is very difficult to estimate accurately even from an observation of the broken floes. The writer has had some experience in ice navigation in the Bering Sea and in Vladivostok Harbor and vicinity. I believe that four or five feet of newly formed ice is an excellent record, even for a battleship. An unarmored vessel such as the old U. S. S *Saturn* could break through only about one foot of new ice. It was impossible to break through thicker ice, not because of insufficient power, but on account of the strain upon the frames and the danger of the ice cutting through the plating. In northern waters it is not unusual for ice to cut through the plating of a steel vessel. Of course, this would not be possible with the *Kentucky* on account of the heavy ram and thick armor.

A specially built ice breaker breaks through the ice not by its ramming action but rather by riding up over the ice which is broken down by the weight of the vessel. These vessels have a clipper bow protected by a heavy ram. They are headed in at a good speed and the ram rides up over the ice which breaks down underneath. The vessel does not come to an abrupt stop but slows down gradually. It is then backed out and the operation repeated until the channel is clear. The ice breaker has twin screws which are well housed in for protection against the heavy ice cakes. The rudder is especially large.

Captain Dismukes stated that "The paths cut through the ice would be almost immediately closed up, thus increasing the thickness due to the piling up of the displaced ice." Ice that is broken up by a heavy wind and packed in against the shore line does become much thicker when it freezes solid. In channels that are to be kept open for navigation this tendency is overcome by running an ice breaker through the channel once or twice each day. In the intervals between trips of the ice breaker, the broken ice tends to freeze together to a certain extent, but before it becomes very solid it is again broken up. Any current or wind will delay its freezing.

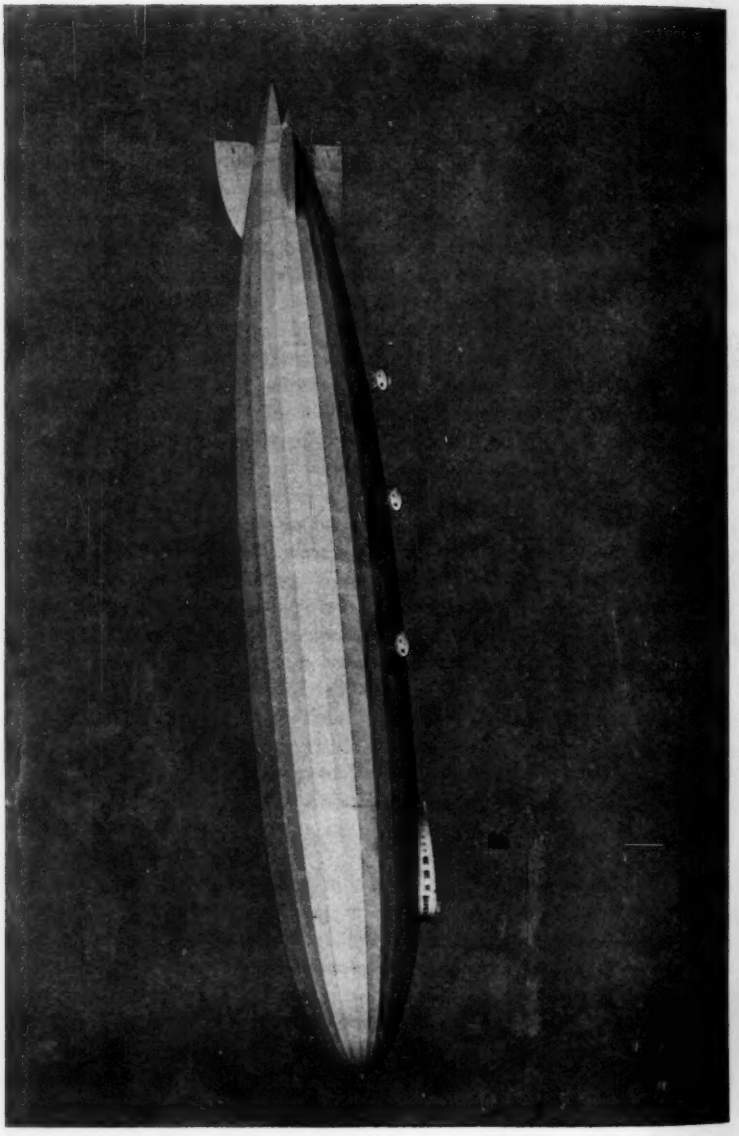
The statement, "In breaking through thick ice, the ship's bow pays off exactly in the direction of the crack," is well established. The direction of the crack depends upon two factors: namely, the resistance offered by the ice itself, and the direction in which the disrupting force is applied. The former depends upon the thickness, structure and age of the ice. It is

obviously not within the capacity of the ship to influence this factor. The second is to a very great extent within the control of the vessel. If a ship is in fairly open water it may be steered in such a direction as to cause the bow to ram the ice at any desired angle. If the vessel is restricted to a lane of open water (as is usually the case) the rudder may be used to influence the crack. Just before the bow brings up, if the rudder is put over toward the side to which it is desired to have the crack tend, the ship's side will exert a great force on the ice to the other side. This will result in compressing the ice off that bow and, other things being equal, the crack will tend off the other bow. This same result could be obtained by varying the revolution of the main engines. Captain Dismukes states, "If it was desired to make headway to the left it was often advantageous to put the rudder hard right and and back full speed starboard engine, thus throwing her bow violently to the right, then on the rebound to drive full speed ahead on starboard engine with rudder hard left." This agrees well as to the method and result but it is believed that the determining factor is the force of compression rather than the rebound. Cracks tend to develop in ice fields probably due to the rise and fall of the tide and the surge of the sea. In narrow waters they are usually parallel to the channel so it is of advantage to follow them.

The statement, "we encountered some very thin ice and for part of this channel there was actually open water" is of considerable interest. Owing to current, tide and, perhaps, wind conditions, vessels are able actually to moor to heavy shore ice thick enough to discharge their cargo over, while the ice on the off-shore side would be thin enough to permit shore boats landing alongside. Men have been drowned by falling through a hole in ice which is elsewhere several feet thick.

The statement that "Only once . . . was it necessary to . . . get a line to pull her stern around" applies to a twin screw vessel. A single screw vessel, owing to her tendency to back to port, cannot back out of an ice field without assistance. Even with the assistance of a tug it is dangerous to back through broken ice as the floes have a tendency to be drawn into and damage the propellor.

When lying in the ice field it is usually preferable to moor to the ice rather than to anchor. In fact, it may be impossible to get the anchor through the ice which would necessitate anchoring with the anchor above the ice. The ice has a certain amount of movement and as the vessel moves with it, an anchor would only hamper her movements. Mooring lines secured to holes in the ice will freeze to the ice throughout their length and hold the ship safely in the position desired. In harbors that are kept open by means of ice breakers the shore ice is usually not broken and as a result it becomes very thick. Vessels that drag their anchors will bring up against this heavy shore ice instead of going aground. The extent of the ice field itself is an insurance against grounding, providing the ice holds together. Should a storm come up it is necessary to anchor, as the ice will be broken up and driven to the lee shore to form a heavy ice pack.



"ZR-3"—To Be Re-named "Los Angeles"

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER H. B. HIRD, U. S. NAVY

GENERAL ARRANGEMENT

VESSELS BUILDING NAVAL POLICY MATÉRIEL PERSONNEL	Great Britain	1863
	France	1874
	Germany	1876
	Japan	1883
	United States	1890
MERCHANT MARINE		1894
ENGINEERING		1898
AERONAUTICS		1912
ORDNANCE		1921
NAVIGATION AND RADIO		1928
MISCELLANEOUS		1928
CURRENT NAVAL AND PROFESSIONAL PAPERS		1935

GREAT BRITAIN

Reconsidering Singapore

Naval and Military Record, 13 August, 1924.—The recent debate in the House of Commons on naval affairs was productive of some distinctly interesting features. Not least among these was the admission drawn from the Secretary to the Admiralty upon the subject of Singapore. The government, said Mr. Ammon, sees no reason to change its views with regard to this scheme—and a moment later he proceeded to explain that it is very probable it will "reluctantly" have to carry out the project if the suggested attempts to still further limit sea armaments prove abortive. The international political atmosphere at the present time is not very favorable to any extension of the Washington principles, and if the Prime Minister intends to await a serene opportunity for inviting discussion on the subject among the powers concerned he is likely to be committed to prolonged patience.

There may be another reason for Mr. Ammon's more acquiescent note. Increasing intimacy with the inwardness of admiralty policy, and the very definite and practical reasons which lie at the back of that policy, may be causing the parliamentary secretary to conclude that the board really does understand its business, and that it is quite possible they are right and the government, therefore, are wrong. This much, at any rate, emerges from the admission of the alternative to disarmament. Of course, if the sea powers are going to pack-up, there is no need for Singapore, and the sea lords would be the first to admit this; but it is because they are perfectly assured that the sea powers have no idea of doing anything of the sort that they still adhere to their original view.

We very much question whether the true reason for the Singapore scheme is generally realized. The tendency is to give a localized importance to the

"ZR-3"—To Be Renamed "Los Angeles"

idea. While it certainly possesses this, the proposed naval base is but a feature in a very much wider strategical project. The problem of the redistribution of the British Navy has been solved upon what would correspond to interior lines in military strategy. The idea is to place our fleets in a dominating position with relation to the navies of other powers.

Ths plan aims at making Gibraltar the great naval pivot of the West, and Singapore the corresponding hub of the East. Between these respective points of grand command will be maintained by far the largest proportion of the striking force of the navy. The first step in this direction has already been taken by increasing the strength of the Mediterranean Fleet. It is scarcely necessary to point out how, in addition to giving a strategical command of first-rate importance, such a distribution makes for the effective guarding of our busiest trade routes. The scheme is aimed at no power in particular. It is simply a case of making the most effective use of our sea strength and, of course, we shall get the Singapore base in due course—possibly quite as soon as the Admiralty contemplated in their proposals for the undertaking.

The promotion of Sir Charles Madden to the highest rank the Royal Navy holds disposes of the rumor that the Admiralty intend to let the number of admirals of the fleet lapse back to pre-war establishment by wastage. In 1914 there were six officers of this exalted rank; in 1924 there are still six. Of these, three—Lords Jellicoe, Beatty and Wemyss—were especially created for their war service. Although no official statement has ever been vouchsafed upon the subject, we believe the intention is that as these distinguished officers drop out of the list their places will not be filled.

In other words, the three war-created fleet admirals are regarded as supplementary to the normal list. No reasonable objection can be taken to this procedure. If the fleet list were to be reduced to prewar numbers by wastage such a course would obviously inflict injustice upon officers eligible for and entitled to promotion who also served with high distinction throughout the long struggle. It is, perhaps, only natural that the advancement of Sir Charles Madden has caused a revival of the rumor that he is destined to succeed Lord Beatty as first sea lord; but, as in authoritative circles two other names are being mentioned with equal prophetic emphasis, it is clearly a case for following Mr. Asquith's very non-committal dictum.

Gradually the fleet air arm is becoming more of a reality than a mere name. It has just been decided to replace in this branch certain grades of the royal air force by naval ratings and marines. This principle is being applied by substituting men from the sea service in all trades which are carried on in warships. In the aircraft carriers, in particular, there is to be a considerable combing out of aircraft hands borne for general duties. The fleet order upon this subject gives the names of 312 selected ratings who are to be gradually withdrawn from ships in which they are serving for drafting into the fleet air arm.

This is obviously a step in the right direction. As the fleet air arm is intended to act with the navy, the desirability that the personnel of it should possess an intimate knowledge of the navy needs no laboring. Doubtless the new arrangement is the result of cooperation between the Admiralty and the Air Ministry, and to this extent is satisfactory evidence of a mutual resolve not to let the aim for efficiency be obscured by the wider question of control.

Freemasonry of the Sea

Naval and Military Record, 6 August, 1924.—The reception which the special service squadron met with on its arrival at San Francisco, fully described in letters and newspapers which have now reached home, will

arouse a sense of satisfaction which goes much deeper than mere appreciation of magnificent hospitality. Four of the latest American battleships came specially to the port in order to welcome the British ships—of itself a compliment which will appeal more particularly to naval men. United States airmen flew out to escort the visitors in through the Golden Gate. The city was a riot of bunting.

We have always maintained that the United States sea service has no sympathy with the political propaganda which is being carried on with the British Navy as the target of comparison. The spirit of comradeship is strong betwen the two fleets.

The Cult of Disarmament

Naval and Military Record, 6 August, 1924.—Fresh from his impressions of the naval review at Spithead, Ramsay MacDonald last week indulged Lieutenant Commander Kenworthy with a little flight of idealism about disarmament. He said that "a reduction of armaments was regarded by his Majesty's Government as one of the essential conditions of national security." Like so many idealistic utterances, this may mean anything—or nothing—for the first question which even Macaulay's much-parabled schoolboy would ask is: "Whose armaments?" If the "other fellow" will disarm, then we agree with the Prime Minister that we have attained an essential condition of national security.

The context of Mr. MacDonald's statement does not lead us to suppose that he meant anything of the sort. We are to do the "beating swords into ploughshares" business so as to "create confidence between the nations." This appears to us just about as dangerous a doctrine a even a Socialist minister could well formulate. Has the Premier forgotten that we tried this policy with Germany for some years before the war? What was the result? She grinned at our confidence, quietly redoubled her efforts, and stole a march upon us. We are glad, at least, that Mr. MacDonald wound up his precept by the admission that "any ill-timed move would do incalculable harm." So long as he simply confines himself to talking about the benefits of disarmament and meanwhile leaves the sea lords to the unfettered minding of their business, we can afford to regard his "dream" (the word is his own) with equanimity but we cannot be threatened with yet another rude awakening.

Fleet Redistribution

By a Naval Officer, *Army, Navy and Air Force Gazette*, 23 August, 1924. —When some time ago the late first lord, Mr. Amery, foreshadowed changes in the distribution of the principal ships of the Royal Navy "to meet the general strategic situation," it was expected that these changes might take the shape of an amalgamation of the Atlantic and Mediterranean Fleets. Sections of the two fleets had often worked together since the war, and it could have surprised few people if such an arrangement became permanent. When the Mediterranean Fleet had been fully occupied owing to the critical state of affairs in Turkey, battleships, cruisers, destroyers and even submarines had reinforced it from the Atlantic. Similarly, when things were more tranquil, the Atlantic Fleet, on one of its periodical cruises to the Mediterranean, had been joined by the fleet in that sea for combined maneuvers off Majorca. If an amalgamation had come it would have been somewhat similar to that made about two years ago by the American Navy Department. The Atlantic and Pacific Fleets of the United States were then consolidated as one "United States Fleet." Although this did not involve any change in the assignment of ships or

personnel, its aim was to facilitate "passing from peace to war conditions, thereby saving time at the beginning of a war when time is vital."

The main idea in this American change was that no part of the fleet was definitely allocated to any one geographical position. The main fighting strength of the Navy was styled the "battle fleet"; lighter units, which had been kept on the Atlantic side, were renamed the "scouting fleet"; minelayers and auxiliaries became the "base force," and patrol craft and submarines, the "control force," organized to exercise control of the sea after this had been secured by the action of the battle fleet. In this respect there can be no doubt that the scheme was strategically sound. It was with much the same idea that Lord Fisher, twenty years ago fashioned the British ships east of Suez into one "eastern fleet," with squadrons in the East Indies, China and Australia, instead of the latter being regarded as detached and separate forces. Later on there was evolved one fleet for the North Sea by gradual stages and by the absorption of the home fleet, channel fleet and Atlantic fleet, all three of which existed concurrently in 1907-9. The title given to this great force, organized to meet the threat of the German menace, was simply "first fleet." Though it had its home ports in the Channel, its exercise bases in the North Sea, and cruised frequently in the Atlantic, it was not specifically associated with either, but was ready to go anywhere according to the need of the moment.

In the changes taking place in British naval distribution, and which began last week by the change of commander-in-chief of the Atlantic Fleet and the relief of the *Queen Elizabeth* by the *Revenge* as flagship, different ideas obtain in view of the great alterations in the naval situation, and a return is being made to a condition of things which resembles that in vogue prior to 1904. The transfer of ships from the Atlantic Fleet to the Mediterranean Fleet will make the latter the strongest British force in commission, but the Atlantic Fleet is to continue, and its position will be somewhat similar to that occupied by the old Atlantic Fleet of 1904-9, which served as a connecting or supporting force between the home and Mediterranean stations. It was pointed out in a recent issue of this journal that the vessels now going from the Atlantic to the Mediterranean—four battleships, a light cruiser squadron, two destroyer flotillas and one submarine flotilla—will not all be additions to the strength of the fleet based on Malta, as reductions have been made there since the settlement with Turkey. The battleships *Ajax* and *Centurion*, for instance have been withdrawn without relief, so has the light cruiser *Cleopatra*.

On balance, therefore, there should be an appreciable reduction in the total number of vessels maintained in full commission when the changes are complete. This should afford an assurance to foreign powers, whose interests lie close to our own in the Mediterranean, that no ulterior motive affecting their welfare has prompted the alterations now taking place. They are but the natural outcome of changes in the general situation, and of a renewed recognition of the importance of the Mediterranean to the trade of the British Empire. The withdrawal previous to the war of our principal ships from the Middle Sea, where they had been stationed for many generations, was recognized at the time as a temporary measure, dictated by more urgent considerations elsewhere. Now that those urgent conditions have been removed by the disappearance of Germany as a first-class naval power, the fleet is free to resume its old distribution. Though, in accordance with historic tradition, the main force will again be known as the Mediterranean Fleet, it may be expected that, as circumstances permit, it will be seen in other oceans from time to time, for training with other forces or for political reasons. No surprise could be felt if heavy ships appeared at Singapore before many months are past.

Modern Battle Tactics

Naval and Military Record, 27 August, 1924.—The Atlantic Fleet, less in quantity, but unbeatable in quality, will leave Portland about the middle of September and proceed to Invergordon, which will form its general rendezvous until the time comes for dispersing to home ports to give Christmas leave. During this period it will be engaged in various tactical exercises, and these are awaited with considerable interest and curiosity in view of the reputation of Admiral Sir Henry Oliver as a diligent student of the battle problems of modern naval warfare.

It seems rather amazing that at this time of day there should be scope left for originality in the handling of a battle fleet under any of the normal conditions which can be foreseen in an action. The experience of Jutland, however, proved that, although the old rudimentary principles may still control all tactical schemes, the evolution of ships and weapons and new methods of warfare make a demand upon the directing brain which it is no mere figure of speech to describe as virtually limitless.

There are those who hold that Nelson's tactics still apply, but in Nelson's time the accepted premise to all battle plans was "rigidity of the line." Today the principal problem lies in determining the greatest measure of value to be got out of high mobility. How conflicting the most expert views may well be was strikingly illustrated at Jutland. Both Jellicoe and Beatty had long been profound students of tactics, yet what the one did is just what the other would not have done had he been in supreme control, and, a century hence the naval historian will be arguing as to which was really right.

Plunging Fire Controversy

Naval and Military Record, 27 August, 1924.—What may develop into the first dispute under the Washington Agreement is threatened by the attitude of the United States naval authorities in seeking to maintain their right to increase the angle of elevation to the turret guns of their earlier battleships. The point was raised some months ago. The British Admiralty then made it clear that, in their view, such a step would amount to an infringement of the Washington Treaty.

Since then Washington has apparently been seeking for a technical point of justification. It is now stated that Japan, France, and Italy concur in her contention. We are constrained to point out that these powers are not wholly disinterested in their judgment. The value of plunging fire was most effectively demonstrated at Jutland, and it would add substantially to the fighting value of a very large proportion of existent capital ships to increase the angle of elevation of their main guns. The Admiralty takes its stand on the spirit of the Washington Agreement. We, too, have ships capable of improvement in this way, but if the restriction of armaments is the real ideal which inspired the Washington Conference, why seek to minimize it by virtue of any subtle technical interpretation? At any rate, the insistence of Washington upon the matter is rather an anomaly at the present juncture, when President Coolidge is professing such undoubted sincerity of solicitude to bring about another disarmament conference.

Even peace brings its regrets, and, although we have no doubt that the officers and men of the British Rhine flotilla are glad, in the altruistic sense, that agreement with Germany has at last been reached, they are probably unfeignedly sorry that the end of their pleasant little job is in sight. It is, of course, true that this force has been dwindling for some time past. From twelve motor launches it is now reduced to five, under the command of Commander Gerald C. Wynter, D.S.O.

In this connection the question seems worth asking as to why we continue

to maintain the Danube Flotilla? Peace with Austria is complete, leaving no contentious questions such as have heretofore existed between Germany and the Allies. We believe there is no sort of resentment on the banks of the "occupied waters," for the British officers and men are extremely popular upon the Blue River, but as a question of public policy the *raison d'etre* of the Danube Flotilla certainly might be defined.

A great many people are also wondering why we still maintain an Irish Flotilla, based upon the southern coast of the Free State? Having withdrawn our troops, given up our naval ports, and generally left the distressful race to work out its own salvation, why should British destroyers be employed to patrol the littoral? Have they any jurisdiction within the three miles limit? Of course, they can enter any port with just as much freedom, if not with as cordial a welcome, as they can call at Vigo or Rio. However, these are political questions. The business of the navy is to go where it is sent.

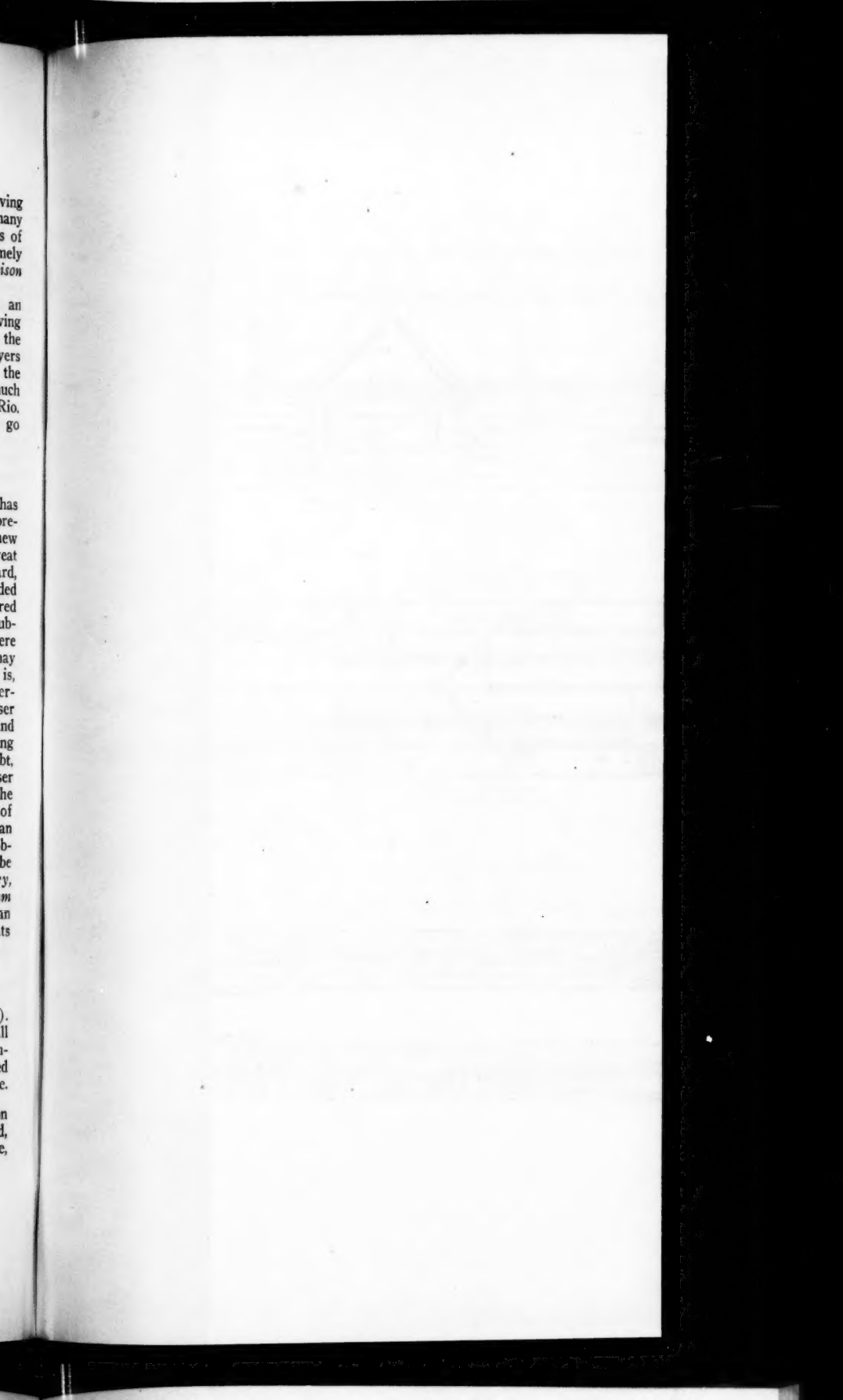
Naval Contract from Australia

The Engineer, 29 August, 1924.—The Australian Naval Defense Bill has now passed through both houses of the federal Parliament, and will presumably be put into force without delay. It provides, *inter alia,* for two new cruisers, each displacing 10,000 tons. One ship is to be ordered in Great Britain, while the other will be laid down at Cockatoo Island Dockyard, Sydney, according to present plans, thought it may eventually be decided to have the second cruiser built in this country also. Estimates prepared by the government, as we mentioned a few weeks ago, show that a substantial saving in money and time would be effected if both vessels were ordered from British builders, though political and economic reasons may impel the authorities to have one ship constructed in Australia. There is, of course, no question as to the ability of the Sydney dockyard to undertake this work. Some years ago that establishment built the light cruiser *Brisbane,* of 5,400 tons, and at a later date it constructed both the hull and machinery of the slightly larger *Adelaide,* which ship is now accompanying the special service squadron on its homeward voyage. There will, no doubt, be keen competition among British firms for the new Australian cruiser as soon as tenders are invited. Including armament and equipment, the contract should be worth something like £2,000,000, a large proportion of which will go in wages. Since standardization of material is now an accepted principle of Empire naval policy, the Australian cruisers will probably resemble in all essential features the five *County* ships which are to be laid down this year for the Royal Navy, just as the *Melbourne, Sydney, Brisbane,* and *Adelaide* were all modeled closely on the British *Chatham* class. Several large submarines are also projected for the Australian Fleet, but no decision seems to have been reached as to where these boats shall be constructed.

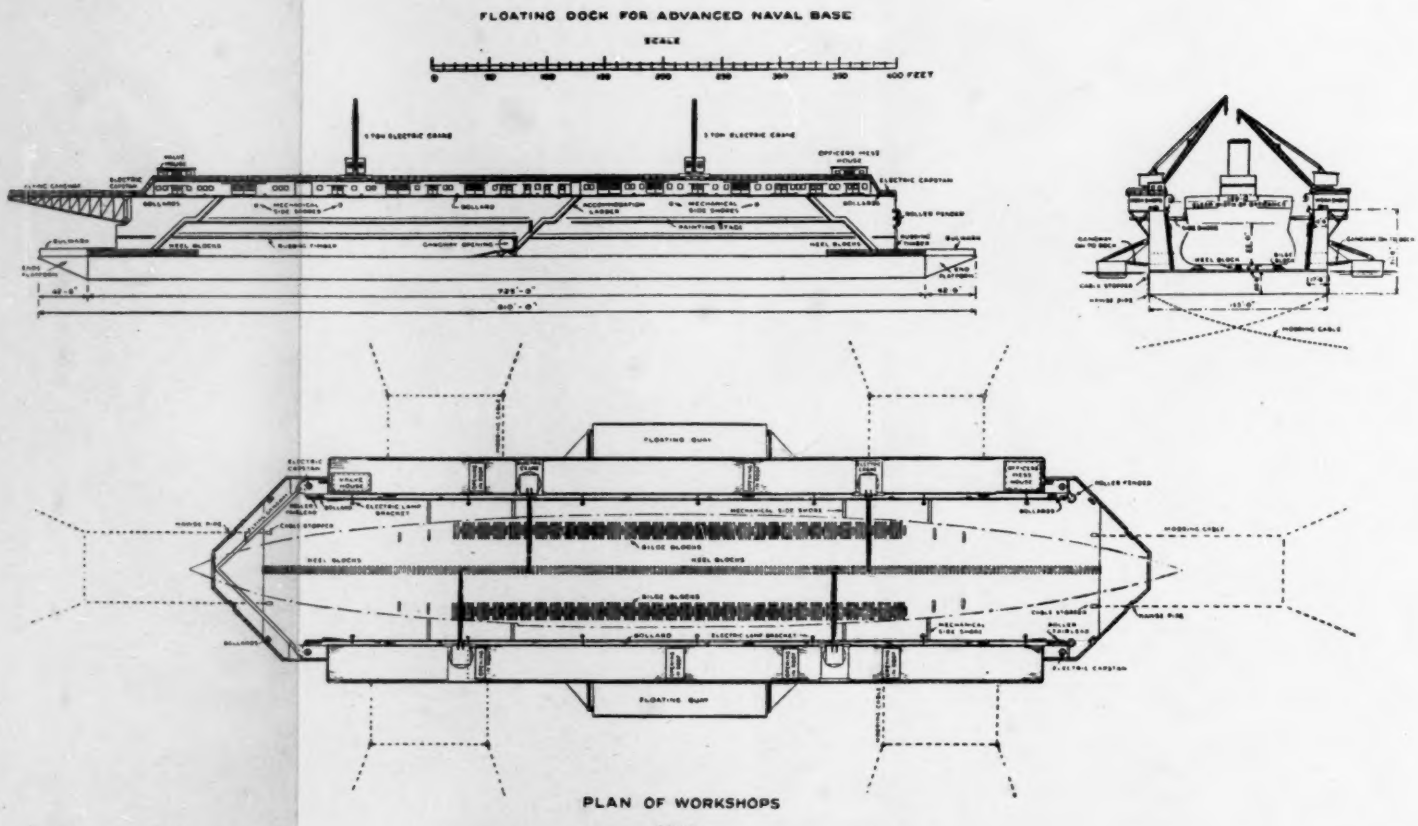
*Advanced Naval Bases**

By S. F. Staples and Captain D. J. Munro, C.M.G., R.N. (Retired). *The Shipbuilder,* September, 1924.—In this paper it is proposed to call attention to one aspect of naval warfare, and from this to deduce conclusions as to the direction in which it appears a nation should proceed when taking into consideration the naval requirements of the future.

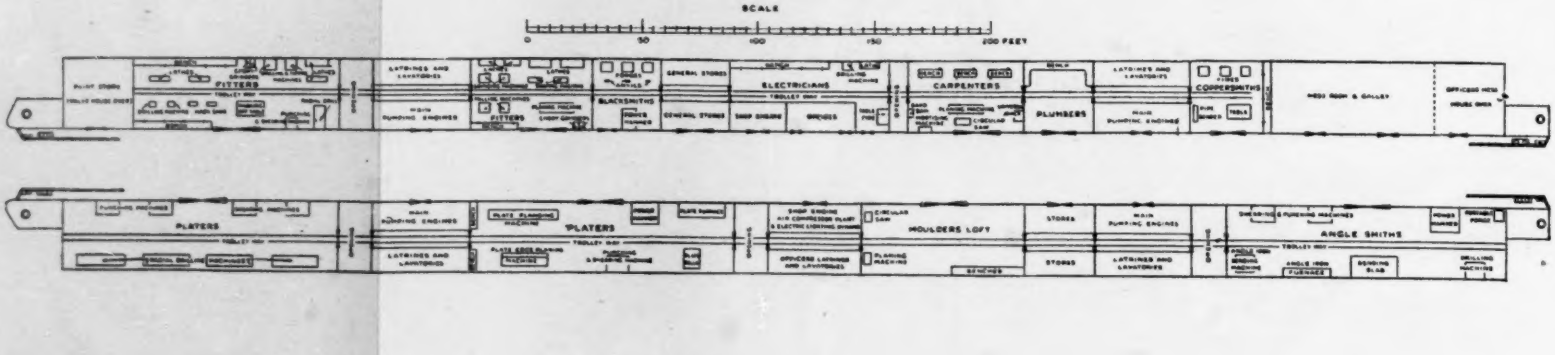
*Abstract of paper read at the Joint Summer Meetings of the Institution of Naval Architects, Institution of Engineers and Shipbuilders in Scotland, and North-East Coast Institution of Engineers and Shipbuilders; 25 June, 1924.



FLOATING DOCK FOR ADVANCED NAVAL BASE



PLAN OF WORKSHOPS



Although strategy is quite outside the ambit of the naval architect, yet once the principles of strategy are made clear either by the teachings of history or by those responsible for the nation's safety, then it is the business of the naval architect to step in and supply the requirements of the fighting forces.

Since the introduction of steam there have been only three naval wars fought between nations possessing first-class navies, and in each case early in the war the same step was taken by the more enterprising of the two belligerents—the establishment of an advanced naval base, so that the fleet headquarters might be as convenient as possible to what might be termed the center of gravity of naval operations.

In the light of historical facts, it would appear logical to arrange that any future naval headquarters should be to a great extent mobile, instead of being built ashore and thus immovable, so that on the outbreak of hostilities everything essential may be ready for instant removal to whatever advanced base the general staff may decide upon as most advantageous for the occasion which has arisen, and much valuable time will thus be saved.

The necessity for the advanced naval base being established, attention is naturally directed to the consideration of what special items a commander-in-chief would desire this base to contain.

As speed is one of the essential features of modern warfare, the provision of a floating dock would first and foremost be called for, in order that ships' bottoms may be kept clean, even if it were not required for the more important duties of repairs after action.

A floating dock to be used in the circumstances now under consideration would have to be specially built for the purpose, as none is in existence that fulfils the required conditions.

The question of a suitable size is largely answered by the conditions of the Treaty of Washington, but the *Hood* has also to be taken into consideration. The *Hood*, of 41,200 tons' displacement, is the sole representative of her class. By the Washington Agreement all future vessels are to be kept down to 35,000 tons.

It would appear that a suitable compromise would be to design a dock especially for the 35,000-ton battleship of the present and near future, but just capable of lifting the *Hood*. As the straight keel of the *Hood* is about 770 feet long, the lifting portion of the dock need be but little more than this.

The clear width of entrance of such a dock should be about 120 feet. More width could be given, entailing a slight amount of extra steel in the hull, if draught of water at its anchorage is a consideration, since the wider the dock the shallower the pontoons for equal lifting power; but, bearing in mind that a mobile dock would have to be towed long distances, there are many advantages in keeping its beam down as much as possible. The draught of water over the blocks of a dock capable of lifting battleships in normal trim should be about thirty-three feet; but during the late war the *Lion* struggled home into the Tyne drawing thirty-nine feet by the head. Commander C. N. Robinson, writing in *Brassey's Naval Annual*, 1924, states that modern vessels when damaged might draw as much as forty-five feet. It would appear, therefore, that a modern dock should have, at normal working stresses, a draught over blocks of about thirty-five feet, but with sufficient freeboard to enable it to be sunk in case of urgent necessity to give forty-two feet of water over the blocks. It may also be noted here that as a floating dock has no sill, the four feet six inches keel blocks, if necessary, might be kept down to eighteen inches, and thus give, without in any way affecting the dock's structure, the postulated forty-five feet.

But a repairing base requires more than a dock; it wants also complete workshops and accommodations for the workmen and personnel.

To turn first to the workshops, these in a floating base may be either on the dock itself, or may be in the form of a separate floating workshop. For general convenience the workshops on the dock itself are the better. As the size of the fleet using the advanced base will be large, it would probably be better to have both, as many repairs will have to be done upon ships which may not be in need of docking.

The floating workshop should be about 400 feet long, with a beam of ninety feet, having three decks and a flat roof. It should be capable of dealing with heavier repairs than could be undertaken in the dock workshops. The hold would be taken up by a foundry and storeroom, the first deck by large machine tools, the second deck by light machine tools and drawing office, and the top deck would contain living accommodations for 500 men and officers. The roof would be utilized for recreation.

Rather than arranging workshops within the restricted width of the walls, a better means of attaining the same end is to outrig considerably the top deck of the walls, and place the machinery there under a roof. The accompanying drawing shows a dock with workshops as described together with the arrangement of the shops. The ultimate size of these shops must, of course, depend upon a variety of circumstances outside the scope of this paper; but it might be pointed out that if the top decks of a dock 700 feet long be outrigged to the extent of thirty feet, rather over an acre of available workshop space will be obtained.

To provide an equivalent to "quay space," which is always of value, there should be pontoons moored on each side of the dock.

In order to save the men's time in going to and fro, mess accommodation would be arranged on the dock, but sleeping quarters would better be found on a separate craft.

The dock described should also be supplemented by a smaller one for the purpose of dealing with destroyers and small cruisers.

In connection with the floating docks, a mooring lighter would have to be provided of sufficient size to take 600 tons of cables on board. This would be sent on ahead of the dock when the base was being moved, so that the moorings would be ready when the dock arrived.

Another important item would be a floating crane, capable of dealing with the heaviest weight on board a battleship. This crane would be transported on the deck of the dock when the base was being moved.

The first cost of a mobile floating base would be very considerably less than that of a permanent land construction. A dock such as described and illustrated would cost approximately £500 000.

Many of the tools with which the dock would be equipped should be available already in the dockyards.

Taking into consideration only those items which would have to be built specially for the purpose, it is considered that a floating base could be fitted out for the following sum:

Large floating dock	£ 500,000
Small floating dock	50 000
Floating crane	200,000
Floating factory	500,000
Mooring lighter	50,000
Launches, etc.	100,000
	£1,400,000

or, say, one and a half million pounds. With this establishment at hand and ready, a base could be rapidly fitted up that would meet the requirements of a fleet operating at a great distance from a fixed base, and so

enable a commander-in-chief to push his attack close to the enemy's coast-line.

In the light of the facts set forth in this paper, is it the right thing to install at Singapore or elsewhere a permanent base on shore, with excavated dry docks, that will take years to complete and cost a large sum of money, the greater portion of which will be spent abroad? Should we not rather provide, at a vastly less cost, the whole of which would be spent in British labor, a floating base fully equipped, which in time of war or threat of war could be bodily and readily transferred to whatever port or base the general staff might deem the best for carrying out its duties?

British Fleet May Aid League to Maintain Peace of World

Baltimore *Sun*, 12 September, 1924.—Geneva, September 11.—Great Britain dramatically dropped a naval bomb into the League of Nations today when Sir Cecil Hurst, eminent jurist and British delegate, declared Great Britain's readiness to accept compulsory arbitration, provided she would not be brought into court because of some act of her navy performed in attempting to maintain or restore peace.

This declaration has set Geneva agog more than anything since Premiers MacDonald and Herriot committed themselves in principle to the settlement of any and all disputes by obligatory arbitration of some world tribunal or tribunals.

The English reservation was interpreted as meaning that once the British Navy begins to operate, her right of search and capture, which formed the subject of controversy between the United States and England before the United States entered the Great War, cannot be questioned juridically. It was immediately supported by Louis Loucheur, speaking for France.

The British statement is being given special attention because of the proposal of the American Government to adhere to the World Court, whose compulsory arbitration clause is under consideration. The effect of the announcement is that if the British reservation is accepted by the other powers, continental countries, led by France, will not only get economic help from England as part of the proposed part of security or sanctions, but also the full and immense support of the British Fleet in case any country in defiance of an arbitral decision opens hostilities and attacks another state.

Sir Cecil declared that the British reservation suggestion was not a Machiavellin subterfuge. In times past there had existed an idea that Great Britain was the tyrant of the seas. Yet, he said, the British delegation was only seeking to discover some method whereby the great cause of organized peace and security could be advanced on terms insuring general progress.

The British representative was addressing the league commission, which is studying revision of the World Court compulsory arbitration clause and the covenant clauses referring to the settlement of disputes. He conceived the object of the league to be not arriving at arrangements which would control war, but which would eliminate war altogether. He was not asking the commission, he said, to take what he was saying as final or a considered expression of what Great Britain wanted, but only as an indication of one difficulty which the British Government felt. He argued that even acceptance of obligatory jurisdiction of the World Court for peacetime disputes was an enormous advance.

What he was getting at, he continued, was that it would be unreasonable to ask a power to support before a court the validity of action taken on behalf of the league, and he believed this to be a sound principle which ought to be adopted. He admitted, however, the conceivability that those

who had already signed the compulsory arbitration clause might wish to make similar reservations themselves.

With all the delegates leaning forward attentively, Sir Cecil explained that the entire difficulty for Great Britain arose because of cases for the settlement of which there were no generally recognized rules of international law. In certain large fields there were two distinct schools of thought, one the Anglo-Saxon school, one the continental school, and when a dispute between two powers involved these two schools he thought the court would certainly be in a position of great embarrassment. This was particularly true in questions of naval warfare.

If the assembly found a satisfactory solution of security and peace the league members, he said, would be invited, if the necessity arose, to throw into the scale all the forces at their disposal in order to enforce the provisions of the covenant and a great sea power might find itself obliged to take action which was certain to bring it into sharp conflict with other nations of the world.

"War on the seas," continued the speaker, "on the other hand, is almost certain to bring a belligerent into sharp conflict with the nationals of foreign powers carrying on trade with enemy states. What would be the position if Great Britain were forced in support of the covenant to enter upon warfare at sea and accepted this system of compulsory jurisdiction of the court? It might find itself compelled to support before the Hague Court the legality of the action it took at the direct request of the league itself and at the request of other members who had, perhaps, joined in similar engagements. The government which accepted that obligation would be placed in a very difficult position."

Speaking for France, M. Loucheur declared that Sir Cecil Hurst had made some well-founded remarks, especially when he pointed out that in case of war the British Fleet might be called upon to watch over security and carry out any measure devised by the league. He hoped that in any future conflicts neutrals would be less numerous.

With regard to the conception that Great Britain was the tyrant of the seas, everybody had observed that from 1914 to 1918 Great Britain was a good tyrant. He would be only too glad if the World Court statutes could be made to apply both to peace-time conflicts and conflicts of war, and if they could be made to apply to all conflicts of a juridical nature considerable progress would be achieved.

"France's standpoint," he declared, "is that she favors either arbitration or submission to the council."

Today's developments greatly cleared the atmosphere and have increased the hope of the continental countries that some scheme of sanctions can be worked out, with the active support of Great Britain, against any state which in the future refuses to submit to arbitration. The outstanding feature of the entire discussion continues to be general acceptance of the definition of an aggressor state, discovered by the Americans, as one which declines arbitration or refuses to submit to an arbitral award.

The League and the British Navy

Baltimore *Sun*, 13 September, 1924.—Sir Cecil Hurst, legal advisor to the British Foreign Office, has made in behalf of his government a semi-official offer to put the world's greatest navy at the disposal of the League of Nations. The disposal has been given immediate, if informal, indorsement by M. Louis Loucheur, chairman of the Reparation Commission and close friend and adviser of Premier Herriot of France. By the representatives of every other power at the Geneva Assembly the project is being given the close attention demanded by its far-reaching nature, for what is proposed is a plan which would unquestionably put teeth in the league organiza-

tion, and give it that power to enforce its decisions the lack of which many critics have harped upon as a point of fatal weakness.

In theory there is nothing surprising in the British Government's virtual offer to use its fleet as a league instrumentality against any member which has rejected international arbitration and been declared outlaw by the Geneva body. Article 16 of the covenant specifically lays down that in cases where a member state has flouted league jurisdiction by an act of war, "it shall be the duty of the council to recommend to the several governments concerned what effective military, naval or air force the members of the league shall severally contribute to the armed forces to be used to protect the covenants of the league," but these provisions for an active international police force have not hitherto been carried beyond the paper stage. Now Great Britain is offering to make them real—very real, when the enormous power of the British Navy is considered.

Since the Corfu incident, when the weakness of the league in face of the defiance of a powerful military state was demonstrated, the issue of actually giving it something more than moral authority has been acute. It has been recognized, on the one hand, that to command due respect and authority Geneva must be prepared to coerce a member which flagrantly flouts responsibilities under the league covenant and refuses to consent to arbitration of a dispute. On the other hand, it has been clear that as long as the League of Nations does not embrace every great power, steps toward the alignment of military force under its control would necessarily appear somewhat like unfriendly alliance to nations not members of the league. As the league grows in experience and reputation, however, it is proving less concerned with the feelings of those nations who spurn membership. What the reaction in America would be does not seem to have influenced Sir Cecil Hurst's important recommendation.

As a matter of fact, there is one phase of this proposal which can be interpreted as being potentially hostile to the interests of the United States. Should British sea power be invoked by the league to blockade a member state which had flouted the league covenant, our ships seeking commerce with that state would probably be as subject to interference as those of any other power, and the British spokesman shows clearly that he appreciates this contingency in making his proposal.

So the difficulties involved again bring into the limelight that question of international relations which is always just below the surface nowadays —Should we join the League of Nations as a full-participating member?

Contrary to a prevalent impression, that question has not been definitely answered. It can, however, become so acute that it will have to be, as the new development indicates, for it is the will of a large part of the world that the league have physical as well as moral authority, and a league which has power cannot be dismissed as a meaningless phenomenon by those in charge of our foreign policy.

British Fleet Offer to League is Withdrawn

Baltimore *Sun*, 16 September, 1924.—London, September 15.—Acting on official orders from London, Lord Parmoor, British delegate at Geneva, has withdrawn his tentative agreement that the British Fleet should be placed at the disposal of the League of Nations to enforce sanctions against an aggressor power refusing World Court arbitration.

Lord Parmoor went much further in the early stages of the negotiations than British public opinion would sanction. When it was realized that the British Fleet might be placed at league disposal by Lord Parmoor, strong representations were made by both the Admiralty and the Foreign Office, which led to hasty and peremptory orders to Lord Parmoor to withdraw from the position he had taken.

There is an unconfirmed report that the attitude of the United States was a determining factor in British unwillingness to accept for the British Fleet the job of the league's ocean control. Hints from Washington are said to have been conveyed that the United States, being a non-member of the league and not recognizing any plan that might be developed there, would not consent to the British Fleet acting against a state, which might incur league sanctions to the extent of interfering with neutral commerce.

Viscount Ishii, of Japan, with French support, is stated here to be active at Geneva in agitating for a disarmament conference to be called by the league and not by the United States. He is stated in diplomatic circles to be behind a memorandum, circulated by the secretariat, which points out it is imperative that the league and not the United States take the initiative because if the invitations come from the United States, Japan might feel unable to accept.

FRANCE

The French Navy

The Engineer, 29 August, 1924.—In view of the importance given to maneuvers by all the countries possessing navies, the French feel that they have fallen a long way behind as a naval power. Until quite recently they have not been able to give attention to the reconstitution of the fighting fleet, which is of little value as judged by postwar standards, and although the program of naval construction will in time provide a homogeneous navy, the country feels that it is not safe meanwhile from attack. The necessity of a powerful navy has grown since the French increased their North African domain, which is now regarded as a continuation of the Mother Country. The vast fertile territories watered by the Senegal and Niger are to be brought within easy distance of Marseilles by the construction of railways and the opening up of air services, and the fact that the Mediterranean is the center of this vast Empire has impressed the French with the importance of keeping it under their own control if they are to maintain the Empire intact. Africa is expected to supply France with ample raw material and man power, and there must be no danger of those supplies being intercepted by a hostile fleet. The problem is obviously not easy of solution. Nevertheless, it is not regarded as presenting insuperable difficulties, and the naval program is based almost entirely upon the keeping open of a seaway between Marseilles and the North African coast. Submarines, destroyers, torpedo boats, seaplanes and scouts constitute mainly the first part of the program, and now follow the 10,000-ton cruisers, which are described as being likely to rival in speed and armament the most rapid vessels of their class in foreign navies. Speed and gun power are what is being aimed at in these new cruisers. Protection is practically nonexistent. It is only when the second part of the program is well advanced that anything will be done with the final installment, about which nothing is known for the moment. The French Admiralty has certainly settled upon the main lines of the program, which may be expected to include a number of battleships, but the construction of the latter is not considered to be urgent. The public has been led to believe that for home defense it is better to spend the money required for the construction of a battleship upon the building of a number of smaller craft, and it is only when the fleet of destroyers, submarines and light cruisers is nearly completed that public attention will be diverted to the battleship.

In France, the Admiralty can undertake nothing without the sanction of Parliament, and no government would spring the construction of battleships upon the country without previously showing their utility. Still, the *Conseil Supérieur de la Marine* is credited with being entirely in favor of forming squadrons of capital ships, in which it is approved by the majority

of naval officers, on the ground that as France has a great colonial empire she must be able to keep open her sea routes with the aid of powerful battleships. To what extent the naval policy will be modified by the change that has taken place recently in France it is impossible to say. Probably, there will be no modification at all, for in questions of national defense the French are little disposed to rely entirely upon the help of foreign countries, and the only factor that may influence the naval policy is a limitation of armaments following upon a settlement of the European crisis, but such limitation could only be effected with difficulty. Its acceptance would depend upon France possessing an advantage in the Mediterranean, sufficient at least to ensure a perfectly safe communication between North Africa and Marseilles. There are many schemes for extending and equipping the Algerian ports, and the remarkable work being carried out in the Caronte to accommodate an enormous amount of shipping in the Etang de Berre is of importance, not only in connection with the construction of the canal from the Rhone to Marseilles, but more especially in providing safe anchorage and landing facilities for a flotilla that could not be accommodated in the spacious new docks being constructed at Marseilles. The Mediterranean between the south of France and North Africa is therefore regarded as an integral part of the Empire. If the seaway is not in French hands, the existence of the Empire may be imperilled. Africa is to supply everything needed by the Mother Country, to the extent that in time of war France would be self-supporting, even to the provision of liquid fuel, which it is hoped to obtain from vegetable oils. Any interruption to the communication between France and Africa would therefore be disastrous for the country's security.

Such communication can obviously only be assured by a fleet capable of fulfilling one single object, and that is the main reason why the French have always refused to accept any restriction upon the construction of submarines, nor will they, under any circumstances, alienate their right to build as many under-water craft and destroyers as may be regarded as necessary for the maintenance of the seaway across the Mediterranean. The question of limiting naval armaments will doubtless come up for discussion in the early future. The French, however, will never go beyond the resolutions of the Washington Conference, and apply the limitation to submarines unless they are assured, by international agreement, the control of the western part of the Mediterranean, but as there are other naval powers in that inland sea, the possibility of any such arrangement being come to appears very remote. The French, however, have no illusion as to the future. Their naval program is being carried out almost solely with a view to ensure safe transport between North Africa and France, and in view of the activity being shown by other countries, they are encouraged to push forward their program as rapidly as possible. The government is also being urged to revive the series of naval maneuvers, which are, for the moment, neglected. It is true that special attention is given to gunnery practice, to the extent that a high degree of efficiency is said to have been attained, but little has been done in the way of keeping seamanship up to the mark, and although most of the vessels are more or less out of date, it is argued that they are still useful for the carrying out of maneuvers. The government is asked to make the best use of the fleet as it is for the training of officers and men until such time as the new fleet will need highly efficient hands.

Change in the Design of Vessels Building Always a Grievous Blunder

Naval and Military Record, 13 August, 1924.—The truth is, a grievous blunder is committed every time the armament of a unit on the stocks is modified, as French naval men have learnt to their cost. *Le mieux est*

l'ennemi du bien. The change in the design of the three 8,000-ton cruisers of the Desaix type (the substitution of four heavy twin turrets for ten light gun positions) spoiled irremediably those promising *croiseurs-cuirassès légers,* and without any gain in gun-power, which was all the more stupid. Just the same thing had happened before with the *gardecôtes* of the *Bouvines* class that were so much *améliorés* when on the stocks that they proved unmanageable at sea. *Se comportent comme des embarcations,* declared Admiral Fournier, but the mistake is worse when changes are made in light-built, fragile torpedo craft, where every inch of steel, every pound of "avoirdupoids," has been minutely calculated, where changes in the distribution of armament are bound to have consequences fatal to stability or to structural soundness. The most valuable quality in torpedo craft is speed and reliability; to diminish these factors vital to efficiency for the sake of a gain in gun power is highly unwise, yet, strange to note, it is just the policy a few experts are advocating in the case of the 2,460-ton *contretorpilleurs.*

GERMANY

Von Spee's Strategy at Outbreak of War

By Captain R. Castex, of the French Navy. Baltimore *Sun,* 2 September, 1924—Paris, August 15.—The phase of the last war which furnishes us with the most interesting lessons in the study of strategy is the German cruiser campaign in distant seas, and in particular Admiral Von Spee's campaign in the Pacific.

I confess that from a military viewpoint I have a weakness for the strategic operations conducted by the Germans on this occasion and find many justifications in the rule of fair play for giving homage to an opponent who deserves it.

Admiral Von Spee knows that he is much weaker than his opposition and that, soon or late, he will be destroyed. He wishes, however, to employ his fighting opportunities to the best advantage and he can do so only by acquiring numerical superiority at the particular point which is to be made the decisive point.

How accomplish it? By building up a *principal mass* ready for nearby campaign, that is to say, by concentrating his powers; further, by taking advantage of the dispersion which he has forced on his adversaries, by means of *secondary attacks* made against the allied commerce by single German vessels.

Von Spee will form his principal mass with the *Scharhorst,* the *Gneisenau,* the *Nurenberg,* the *Leipzig* and the *Dresden.* The scattering of the allied vessels will be brought about by attacks to be made upon them at all points of the globe by the *Karlsruhe,* the *Emden,* the *Koenigsberg* and numerous auxiliary cruisers.

When this situation is brought about, when the vessels of the British, French, Japanese, etc., are scattered over all the oceans and are concerning themselves only with the defense of their merchant marine, the German admiral, with a small force concentrated and well in hand, will have a good chance of falling upon the weak point in the immense cordon of the enemey's defense, and of emerging victorious.

This concentration must be effected quietly in a region where there is no chance of being disturbed. Where can he go? Not to the seas of the Far East, which are full of British and Japanese vessels; not to the Indian Ocean, where it is pretty much the same thing. The Germans will be immediately spotted and vigorously pursued.

There is only one solution—to go directly to the Pacific, which is almost deserted, where the trail can be lost, where the ships can cruise

about safely, keeping ahead of the *Leipzig* and the *Dresden;* then to move the whole theater of war to the other side of this ocean along the coast of Chile, where a powerful *Germanophile* party will be able to furnish information and supplies; to appear there when nobody is on guard and fall upon isolated vessels with a good chance of victory.

This is what Von Spee does. He crosses the Pacific from northwest to southeast, effects at Easter Island his junction with the *Leipzig* and the *Dresden* and at Coronel wipes out the unhappy but heroic Admiral Cradock.

Of course, we must add that this plan, which is highly commended, could be carried out with its complete and happy result only thanks to the numerous blunders of the Allies. The documents which we now have show us these blunders and permit us to draw from them some excellent lessons.

If Von Spee crosses the Pacific so deftly and if he arrives safe and sound off the coast of South America it is because his opponents let him do so, because they did not concern themselves with him at all and because they neglect what should have been their first concern—the principal organized force of the enemy, which is made up of the five cruisers of the German admiral.

Nothing whatever is done to stop them and destroy them.

Instead of searching for the enemy fleet the British squadron in the China Sea sets out to make a raid upon Yap and to patrol the Yellow Sea. Soon it moves off toward Singapore, thus turning its back upon Von Spee.

The Australian Fleet of Admiral Patey does not bother itself about the German Fleet. Absorbed by "geographical objectives," it goes off to conquer the Samoan Islands and then promptly returns to Australia. It must be said in explanation, however, that these operations were ordered by the Admiralty, which wanted, above everything else, to satisfy public opinion in Australia by conquering the German colonies. This is the well known and disgraceful rôle which public opinion plays in the matter of military operations. Strategy does not always do what it wishes to do. It is sometimes obliged to reckon with factors entirely foreign to the military point of view. In England's case the state of mind in the dominions was perhaps more important than the immediate destruction of Von Spee.

The Japanese squadron (the *Tsukuba,* the *Kongo* and the *Kurama*) remains between Japan and the Midway Islands and does not stray much farther. The first Japanese detachment organized later on goes to Jaluit, in the Marshall Islands, and does not go beyond there, Von Spee can be at ease in that direction.

Obviously, until September 15 no one knows what has become of him, but on this date it is learned that on September 14 he arrived off Apia. What are the Allies going to do? The Japanese reach Jaluit and stay there. The Australian squadron, still under orders of the Admiralty, goes off on September 22 to conquer New Guinea, a new "geographical objective" and all this while Von Spee continues undisturbed toward Tahiti.

He passes there on September 22 and the news is known in London on September 30. Some time later, October 4, a telegram which has been intercepted makes it known that the German squadron is going from the Marianna Islands toward Easter Island. There is no longer any doubt about its position or its destination, yet no measure for reinforcement is taken in favor of Admiral Cradock's squadron, which is much too weak to accept battle. The British vessels remain scattered from Brazil to Chile.

Admiral Patey's squadron, by London order, is nailed down at Suva as a defensive covering in case Von Spee should come back toward Australia. The *Minotaur* and the *Ibuki* are paralyzed (for independent duty) as convoy escorts. The Japanese have ceased altogether to worry themselves about German cruisers. The cruiser off the Mexican coast stays there and does not go toward the south.

The result of all these errors is that Von Spee, left at liberty, can at leisure effect the concentration of Easter Island, can arrive suddenly off the coast of Chile and carry off his victory at Coronel. He will be destroyed in turn at Falkland only after the English have learned—at last—that it is necessary to take the offensive against him, to run him down and to annihilate him in order to end the business.

This campaign, then, has verified the excellence of certain old strategic principles well known, since the days of Suffren and Nelson, and forgotten at the moment:

1. The organized force of the enemy, his principal mobile force, is the only thing which matters. As long as it is not destroyed or rendered impotent nothing is being accomplished. First of all its destruction or its blockade must be the chief concern. Everything else can come afterward.

2. Geographical objectives are evil things when they occupy the mind too soon, that is, before the enemy fleet is put out of business, and when they cause neglect of the main issue.

3. Anxiety about purely defensive measures (such as coast defense and protection of commerce) lead to a scattering of forces, to a great expenditure of power, to decreased strength and to a total lack of mobility. Nowhere is there any strength, and defeat can eventually come even from an enemy who has less actual strength but who keeps on the offensive and by concentration and adroit maneuvering maintains the initiative in the campaign.

4. It is not always possible to do the desirable thing in strategy. Many side considerations intervene. Whoever can be free of these side considerations has a great advantage.

5. The German High Seas Fleet, by remaining idle, was of no help to Von Spee and allowed the English to send battle cruisers to Falkland. The German High Seas Fleet forgot the matter of liaison.

There are some good truths, obvious truths, let us say. Everyone knows them, but, easy as it is to present principles, it is difficult to apply them, and the art of war is still above all else, as Napoleon said, "an art of execution."

New Plan for Making Wars Less Probable

By H. Wilson Harris, Baltimore *Sun*, 1 September, 1924.—London, August 16.—The reference in President Coolidge's acceptance speech to the possibility of a new conference on the limitation of armaments has aroused some interest on this side of the Atlantic. No such proposal coming from such a source could be disregarded, but it must be admitted at once that those who have given closest thought to the armament problem are most skeptical about the possibility of solving it even in part through any single conference.

That criticism is not directed against Mr. Coolidge's suggestion. In point of fact the conference idea—not, of course, that there is anything new about it—was thrown out by the British Prime Minister in the recent note in which he rejected the draft treaty of mutual assistance submitted by the League of Nations Assembly to the various governments for their comments. Having turned down this concrete plan of disarmament, and feeling the necessity of adding some positive proposal to a note essentially destructive in character, Mr. MacDonald put in a final paragraph hinting, like Mr. Coolidge's acceptance speech, at some international conference at some future date to tackle the disarmament problem afresh.

The paragraph in question has provoked a great deal of caustic comment. There have been suggestions, for which no foundation appears to exist, that the Prime Minister has some plan of his own up his sleeve to be produced rather dramatically at the coming league assembly at

Geneva. Mr. MacDonald's own reference to a future international conference seems to dispose conclusively of that idea, but that does not mean that disarmament will not be discussed very fully at the assembly.

The French will not willingly let the treaty of mutual assistance drop. It gives them pretty much what they want in the way of security and Paris comments on the attitude of the British Government have been intelligibly bitter.

The Little Entente powers, particularly Czecho-Slovakia, under the leadership of Dr. Benes may be expected to take the same line. They realize that however the armament problem may be solved it can be approached only after long and systematic preparation carried out by a permanent body like the League of Nations, and that the results achieved will not be dramatic or final, but gradual and cumulative, another reason why there must be a permanent body like the league to superintend the slow process of laying brick on brick.

There are none the less signs that the armament discussion may be taking a new turn. The controversy, if so it may be termed, has passed through two distinct phases. First of all there was the endeavor to secure reduction of armaments by the direct route. The Washington Conference may be regarded as the most successful attempt in this direction, but so far as land armaments are concerned no progress worth mentioning has been achieved at all.

Next came the treaty of mutual assistance, laying down the principle that you cannot expect to get disarmament unless you insure to the disarmed nation security such as armaments are believed to confer. In a limited form this principle may be said to have been carried into practice by the Little Entente states, who claim that but for their agreement to defend one another in case of need their individual armaments would have had to be considerably greater than they are.

Now there are, as has been said, signs that another theory, more familiar as yet in the United States than in Europe, may emerge into prominence at Geneva, and quite possibly elsewhere. That consists of the doctrine that to attempt to limit armaments while more or less recognizing the perpetuation of war as a method of settling disputes between civilized nations is hopeless, as well as being essentially immoral, and that the direct road to the elimination of war altogether, though it may seem the hardest, is in reality the shortest.

This, so far as we understand the situation over here, is substantially the position taken by Senator Borah and his supporters in the outlawry of war movement, and it is substantially the position taken by the unofficial American committee, of which Generals Bliss and Harbord and Professors Shotwell and David Hunter Miller are members, which has drawn up an alternative version of the treaty of mutual assistance, placing in the forefront of everything the readiness or otherwise of a state to submit its quarrel to the Permanent Court of International Justice.

Neither the Borah plan nor the committee plan is likely to come officially before the league assembly, though the latter has been communicated to members of the league council and circulated to its members. If the subject comes up it is likely to be in connection—a curious and interesting fact in itself—with the reply of the German Government to the league's request for its observations on the treaty of mutual assistance.

Confronted with this request the German Cabinet intrusted a committee of politicians of all parties with the task of drawing up a statement and this has been sent to Geneva as representing the views of the government. Germany, of course, rejects the treaty as it stands—in any case special arrangements would have had to be made for a country which, while already disarmed itself, might have been called on to help defend some other

country made the victim of attack—but the important part of the reply to the league consists of its concrete proposals.

The Germans lay it down in effect that the method of settling quarrels by war must be banned forthwith. Law must here and now take the place of force, and force, as between civilized nations at any rate, must be used only by the society of nations as a whole against any state refusing to submit to the law of society. It is strange to find Germany, which has always stood aside from the league and looked askance at it, declaring that "what we want is not an accumulation of treaties side by side with the covenant, but an intensification and refinement of the covenant itself."

The Germans' positive demands are worth quoting textually. "Forbid," they say, "the forcible settlement of disputes. Forbid altogether the forcible attempt to obtain one's supposed rights. Interdict all special agreements which shelve or contravene the general treaty. Remove all hindrance left by former treaties. Side by side with the Court of International Justice for purely legal disputes create a court of arbitration for political conflicts and endow it with every guarantee of the judicial independence of its members. Decree compulsory adherence thereto, as well as to the Permanent Court of International Justice.

"Endow both courts with the right and duty to issue provisional injunctions *uti possidetis,* especially in reference to the obstensibly peaceful occupation of foreign soil. Appoint an organ which shall oppose the peace breaker with the weight of the League of Nations in order to carry into effect the decrees and all other decisions of the Court of Arbitration and the Court of International Justice. Above all, make disarmament obligatory upon all nations. Finally, see to it that the justified wishes of the population for an adjustment of frontiers be met by means of properly regulated legal procedure."

Here, at any rate, is a definite plan, which, with whatever modification may seem called for on examination, is well worth the attention of the league assembly. What view will be taken of it is uncertain, for the plan itself has had no publicity in this country, or, so far as can be discovered, elsewhere in Europe as yet, but all replies to the league assembly's inquiry of last year must come before the league assembly this year and it will be both surprising and unfortunate if the German proposals do not give rise to important and fruitful discussions. Even in their present form they are notable evidence of the new orientation of men's minds on the disarmament problem.

The German Navy

By Sir Herbert Russell, *Naval and Military Record,* 2 September, 1924. —Were it not for the lingering of indignant memories one might find something almost pathetic in the announcement that the German Fleet will assemble at Swinemunde and proceed to sea on September 4, to carry out maneuvers, which will last until September 10, for when one considers the contrast between the attenuated and largely obsolete force which will represent the sum total of German sea power in these exercises and the magnificent and powerful High Seas Fleet which carried the Imperial German flag on the occasion of the last naval maneuvers, eleven years ago, it is rather difficult not to feel just a wee touch of sympathy for the officers and men as they gaze around upon their "little all" and realize how great has been the fall since those days of spacious splendor. In 1913 Germany was the second greatest sea power in the world, and it was only by means of lavish expenditure and the ceaseless activity of our dockyards and shipyards that we kept her at that. Today she is a second-class sea power, and, although she could make some sort of spectacular display in a naval review, the fighting value of her ships is extremely low.

Her battle fleet numbers eight ships, launched between the years 1902 and 1906. Five of these have a displacement of 12,997 tons apiece; the other three a displacement of 13,040 tons apiece (*Hannover, Schlesien,* and *Schleswig-Holstein*). These latter ships are credited with a speed of 19.5 knots; the remainder with a speed of about 18 knots. It is quite possible that they may be capable of more, for the Germans always understated the speed of their ships, as Jellicoe discovered at Jutland, and it is safe to say that they will have maintained such vessels as are left to them in the most complete state of efficiency; but in any case, their mobility is far short of that of any *Dreadnaught* class.

The armament of these capital ships is the same throughout: that is to say, four 11-inch guns mounted in one forward and one after turret, and a powerful secondary battery of fourteen 6.7-inch and twenty 3.4-inch guns. Two of them are permitted to retain their armament, but not to take in any ammunition. They are fitted with six submerged torpedo tubes, have a possible coal endurance of from 1,600 to 1,800 tons, and carry complements ranging between 650 and 750 officers and men. They are the two last batches of pre-*Dreadnaughts* which Germany built, and compare but indifferently in general fighting value with their British contemporaries of the *King Edward VII* class.

Of light-cruisers, Germany retains seven, built between 1899 and 1905. Two of these (*Nymphe* and *Niobe*) are permitted to keep their guns mounted only on the understanding that they never have any ammunition on board. The average of their displacement works out at about 3,000 tons, and the fastest of them is not good for more than twenty knots. The armament throughout consists of ten 4.1-inch guns.

For the rest, the German Navy of today numbers twelve destroyers of mixed prewar types, twelve torpedo boats of low sea-going value, and four more destroyers and a like number of torpedo boats, which are prohibited from having any ammunition on board. The precise purpose achieved by this restriction is not very clear. The vessels retain their armament and are maintained in a state of general efficiency, like the rest of the fleet. There is nothing to prevent them from proceeding to sea with their consorts at any time and taking on board a share of their ammunition. Probably they are kept without gunsights, but this omission would present little difficulty to the resourceful and very thorough Teutonic mind.

I have no knowledge of the character of the "maneuvers" about to be held. Probably the word is too grandiose; tactical exercises would be better. They will doubtless be confined to the Baltic, to which Germany's naval "future upon the sea" is just now limited. She has lost interest in the North Sea. Heligoland is in ruins; Wilhelmshaven has become quite a dull place. Indeed, in the present position of international affairs the Baltic is the natural and proper strategical zone of the German Navy. At the present time a Soviet Union Fleet, which the Bolshevists have somehow got together, is reported to be pottering about somewhere in this sea, also carrying out "naval maneuvers." Probably this fact is no more taken seriously in Germany than it is in this country. At the same time, it holds a very much greater potential significance for Germany than for any other European Power. The Russians are a paradoxical people, and it would be merely in keeping with this quality if they should suddenly develop a great burst of naval activity. As to what material remains to them from which to evolve the nucleus of a modern fleet, we have but the scantiest and most contradictory information; but clearly they have made a beginning, and this cannot but be a source of interest if not of actual concern, to Germany.

Accepting the premise that the doctrine of *Deutchesland über Alles* has been effectively killed by the *alles* in question, it seems to me that an adequate and efficient German Navy is not only desirable, but necessary, as

a balancing factor. France and Italy are the only first-class naval powers remaining in Europe today. The latter is naturally satisfied to limit her activities to the Mediterranean: the former certainly regards this as by far her most important littoral. For reasons which have but very slight, if, indeed, any, direct reference to this consideration, Great Britain is just now engaged in transferring the preponderant weight of her striking force to the Middle Sea. As I have previously pointed out, this policy of taking up the interior line of sea communications is essentially a wise one. When decided upon it was regarded as the first step in the creation of a defensive chain, the limits of which should be Gibraltar and Singapore. Whether this strategical conception will fully materialize remains to be seen; but I believe that the present government has come to regard it as the alternative to failure in a further disarmament movement.

Apart, then, from the reduced British Atlantic Fleet and quite small French sea forces we have no grouping by first-class European naval powers north of Gibraltar. True, the existent situation of affairs does not necessitate any such grouping. Denmark and Scandinavia have never aspired to the status of anything more than minor naval powers, and their fleets consist principally of coast defense forces.

If Russia were to make a serious bid to recover her former position as a first-class sea power we should be faced with quite a new orientation. There is always a possibility of a rapprochement between Germany and Russia, notwithstanding that there is nothing in existent indications to favor such an assumption. This, I must confess, is the one possibility to neutralize my view that an adequate German Navy is desirable, because I base this desirability upon the condition of balancing and not the possibility of coalescing, but it is difficult to see what Germany could hope to get out of a military alliance with Russia. She herself is much too low down the scale of armed efficiency—at any rate by sea—to contemplate any possibility of a fresh bid for dominance on the strength of linking up with a power which is lower down still.

More reasonable is it, therefore, to assume that Germany will view any signs of a revival of Russian sea power with mistrust. To the Teutonic temperament the present political ethics of Russia are absolutely abhorrent. If Bolshevism seeks any military alliance it will only be for the sole purpose of spreading Bolshevism. Now, whatever else we may say or think about the German Navy, I think we may at least give it the credit for being about as anti-Bolshevist an organization as it would be easy to name.

Admittedly, I am arguing in long views. The German Navy cannot be anything more than what it is for a great many years to come. Of the Russian Navy one cannot speak with such finality; it is outside of the Washington Treaty; outside of anything in the way of restrictive influences; but it has a mighty long way to go yet before we need trouble to regard it as a serious factor in the problems of world sea power.

The existence of an efficient, frankly anti-Bolshevist German Navy may very well prove a most effectual deterrent to any Russian schemes of naval revival. That such schemes exist is no mere casual supposition. At the Rome Conference, convened by the League of Nations in the spring of this year, the Russian naval commander-in-chief talked in a way which sent a shiver down the spine of every good Leaguist. He *objectskied* to *everythingski* in the way of pacific proposals. He talked heavily of big ships and big guns. Of course, it was "hot air," but even "hot air" is an expression of mentality. I trust that he will study the German naval maneuvers and find in them the one useful lesson which they seem to me most likely to hold.

Last Arms Survey Made in Germany

Washington *Star*, 11 September, 1924.—Berlin, September 10.—The last military inspection of Germany by the Allies is under way, after many postponements. The population has been requested to remain calm and not hinder the inspection, which will cover police and military barracks and munition plants.

Conditions of the inspection are said to favor Germany. The inspection began simultaneously by allied officials in different parts of Germany, and is not expected to consume many days. The Communists and Nationalists, who sometimes have revealed hidden arms stores belonging to each other, have taken the attitude of treating as traitors any who reveal armament secrets. Hence it is not expected that much will be found. Also Germany has lost much of its spirit of revenge now that the French have released their pressure and the super-nationalists are losing their influence.

If the inspection proves satisfactory the allies have promised that it will be the last.

The German Fleet maneuvers have been completed and the army maneuvers are in progress. Germany's army, though small, is very efficient. A mobile division crossed the Oder River on pontoons in record time. Observers said it was a fine sight to see the dispatch with which the pontoon bridge was laid.

JAPAN

Japan to Replace Armaments Lost in Quake Disaster

Baltimore *Sun*, 11 September, 1924.—Geneva, September 10.—Although remaining faithful to the new policy of decreasing military burdens, Japan eventually hopes to make good the armament losses she suffered in the great earthquake and fire of last year, declares a communication received today by the League of Nations from the permanent Japanese delegation to Geneva.

This communication confirms the reservations made by Viscount Ishii at the June session of the council when the council members gave their views on the assembly resolutions asking all countries not to exceed in future their military budgets for the current year. Viscount Ishii at that time declared Tokio's 1924 budget was abnormally small on account of the disaster.

Great Britain stands behind the league covenant, which provides for military and naval assistance by all the signatories to preserve peace. This declaration was made tonight by Lord Parmoor, representing the British Government, after the disarmament commission debate on arbitration, security and disarmament.

In a statement to the press, Lord Parmoor affirmed that Great Britain meant what she said, when through her Prime Minister, Ramsay MacDonald she declared her readiness to submit all disputes to arbitration. He added that the words "all disputes" included those usually characterized as questions affecting vital interest and national honor.

Lord Parmoor qualified his statement, however, by remarking that the terms "vital interests" and "national honor" were exceedingly vague, but went on to say that a way must be found to handle every possible cause of conflicts between nations.

The British statesman contended that, after all, the league covenant covered nearly everything, and it was only necessary to clarify certain points and perhaps generally strengthen the covenant.

Japan took an active part in the disarmament debate. M. Matsuda, *charge d'affaires* at Paris, making what was considered an important declaration.

Referring to compulsory arbitration in connection with the draft treaty of mutual assistance, M. Matsuda said that no government was more desirous than Japan to see the peace of the world established on a basis of justice, but the problem was so delicate and vital that it could not be discussed at the present moment. He would make observations on this point later, he said, but he doubted whether the desired end could really be achieved by the compulsory arbitration clause in the World Court of Justice.

The Japanese view, M. Matsuda continued, was that to obtain a really solid guarantee of peace by arbitration it would be necessary for every state in the world to be prepared to accept the exclusive competence of the World Court on all questions, even though its vital interests and honor were concerned. He feared there was no present possibility of this.

Outlining the British view before the commission, Lord Parmoor said that the test of an aggressor nation was its refusal to accept arbitration. He argued that non-judicial matters could be submitted to the council under the terms of the covenant and declared that suitable sanctions should be arranged so that the world would be safeguarded against aggressor states. These sanctions, he said, should be stringent and operate immediately.

Concluding, Lord Parmoor asserted that all schemes would be imperfect unless Germany was a member of the league, because Germany must be a party to the plans for arbitration, security and disarmament.

Bishop Fan S. Noli, Premier of Albania, delivered before the assembly of the League of Nations today an ironical address on world political conditions which evoked a great deal of laughter and some mild demonstration of disapproval.

The Premier, who was educated in Harvard University, talked for the most part about the United States. He described Boston as a city situated somewhere in Ireland, "full of O'Conners, O'Connells and Fitzgeralds, all of them good workers, who, with other Irishmen, do all the talking in American electoral campaigns."

Bishop Noli wished the Irish Republic had brought to Geneva some brave orators who might "talk the assembly to death about peace."

There is no wonder, he continued "why the Americans, Germans and Russians are not anxious to join the League of Nations. They do not appreciate our speeches. They know better."

Bishop Noli said the assembly was nothing but "words, words, words—which means, in plain English, hot air."

Says Japan Has Clear Conscience About Arms

By K. K. Kawakami, Baltimore *Sun*, 18 September, 1924.—Washington, September 15.—In the American-British controversy over the right of a navy, under the Washington Treaty, to elevate the guns of its battleships; in the recent propaganda, emanating, to an outside observer, from some mysterious sources, for the imperativeness of increasing the American Navy or its efficiency; in the repeated suggestion of President Coolidge for another conference for limitation of armament—all these controversies and the campaign of publicity Japan has followed with a keenest interest. She is decidedly in favor of another conference akin to the one held in Washington three years ago. Whether such a conference be held in America, or in Europe, she thinks she could participate in it with clear conscience born of the conviction that her policy in recent years with regard alike to armament and to her Asian neighbors has been moderate, liberal and sincere.

To speak the truth, Japan was ill at ease when she received President Harding's invitation to the Washington Conference. She knew that she would be called upon to relinquish her rights and interests in Shantung.

She knew that her acts in Siberia would be challenged. She knew that she would have to sacrifice many of her warships. Her chauvinists saw a "great national calamity" in the proposed conference. Japan, in short, accepted the invitation with no cheerful feeling but with forebodings.

Today she is in a new situation. At the Washington conference she pledged herself to give up everything which she could possibly give up, which any nation, situated as she was, would possibly give up. To that pledge she has ever since faithfully adhered in regard not only to armament but to China and Siberia. As a result China's feeling toward Japan has signally improved, while Soviet Russia is seeking a treaty with Japan.

It is no exaggeration to say that in proportion as Japan has risen in the respect and friendship of the Chinese, the United States and Great Britain have suffered a fall. Indeed, anti-foreign agitation in China has of late been directed against the latter two countries rather than against Japan. This change of attitude on the part of China is due to a multiplication of incidents, such as America's firm stand taken on the killing by a Chinese soldier of an American merchant named Coltman, the British-American proposal made in the wake of the Lincheng kidnapping incident, for the international control of Chinese railways, a spectacular naval demonstration, chiefly British and American, to prevent Dr. Sun Yat Sen's control of the Canton customs, and the persistent clamor by the American merchants in China for the inauguration of a more vigorous China policy by the State Department.

In all such incidents Japan acted harmoniously with America and Britain because she wished to be courteous to them rather than because she was in hearty accord with them, and the Chinese knew it. To make the situation worse for America and Great Britain, the Soviet propaganda, which was formerly directed against Japanese "imperialism," is now directed at American and British "aggression" in China. This propaganda, call it seditious of you will, is having a telling effect upon the Chinese mind.

In the coming international conference, then, Japan has nothing to fear in the direction of China or Siberia. In the matter of armament her position has become equally invulnerable. In a previous letter in these columns I told some of the things Japan had already done for the reduction of her naval armament. Not only has she deleted the battleship fleet in compliance with the Washington Treaty but she has altered her building program for auxiliary craft, on the construction of which the treaty placed no restriction.

The modified program calls for the building, in the five years 1923-27, of eight cruisers, instead of the original nine; twenty-four destroyers, instead of the original thirty-seven, and twenty-two submarines, instead of the original forty-six. According to the published estimates of the Japanese Navy Department, the building expenditures under the new program are considerably smaller than the estimated expenditure under the old plan, as shown in the following table:

Year	*Old Estimates*	*New Estimates*
1923	$73,706,551	$58,131,239
1924	73,895,100	55,000,000
1925	71,629,209	55,000,000
1926	56,846,428	42,500,000
1927	57,688,677	35,527,000

The difference between the old and the new estimate does not seem, it may be said, quite commensurate to the number of ships and the tonnage actually eliminated in the revised program. This is due to higher prices of building materials and higher wages of labor now prevailing. Consequently, building expenditures under the new plan are computed on the basis of a ninety per cent increase over the prewar costs.

What will be the relative strength of the British, American and Japanese fleets of auxiliary combatant ships when the Japanese building program is completed at the end of 1927? The answer is contingent upon the actions of the American and British Governments in the coming few years. The last Congress authorized the building of eight cruisers, but failed to appropriate the necessary funds for that purpose. What the next Congress will do is not known. In the meantime the Labor Government of Great Britain has called for bids for the construction of five cruisers.

Presuming, however, that these projected American and British cruisers will not be built between now and 1927, the Japanese Navy has estimated the relative strength of the British, American and Japanese fleets of auxiliary ships as follows:

Cruisers: Japan at present has 25 cruisers, aggregating 148,170 tons. Great Britain has 50 cruisers, aggregating 295,670 tons. The United States has 23 cruisers, totaling 182,625 tons. Therefore, the present ratio is: Britain, 1.42; the United States, 1.00; Japan, 0.81. By 1928 Japan will have 28 cruisers, with a total tonnage of 171,055; Britain 55, aggregating 299,830 tons; the United States 10, totaling 75,000 tons. The new ratio will be: Britain, 3.9; Japan, 2.2; the United States, 1.00.

Destroyers: At present Japan has 100 destroyers, totaling 77.653 tons; Britain 200, totaling 234,960 tons; the United States 317, totaling 367,388 tons. The ratio is: Japan, 0.31; Britain, 0.64; the United States, 1.00. By 1928 Japan will have 92 destroyers; Britain, 201; the United States 280. The changed ratio will be: Japan, 0.31; Britain, 0.71; the United States, 1.00.

Submarines: At present Japan has 37 submarines, aggregating 24,377 tons; Britain 68, totaling 58,540 tons; the United States 133, totaling 77,322 tons. The ratio is: Japan, 0.31; Britain, 0.76; the United States, 1.00. By 1928 Japan will have 67 submarines, totaling 68,536 tons; Britain 76, aggregating 68,370 tons; the United States 121, aggregating 84,900 tons. The new ratio will be: Japan, 0.81; Britain, 0.81; the United States, 1.00.

In preparing the above estimate the Japanese Navy has left out of consideration all cruisers older than seventeen years and all destroyers and submarines older than twelve years. These age limits are adopted because at the Washington Conference the original American proposal called for replacement of cruisers over seventeen years and of destroyers and submarines over twelve years.

These estimates reveal, or rather confirm, the marked inferiority of the cruiser strength of the American Navy, as compared with British or Japanese strength. It is small wonder that the advocates of preparedness should raise a hue and cry against the failure of Congress to provide more money for the navy. At the same time the American Navy is comparatively strong in destroyers and submarines. According to the Japanese Navy, the combined ratio of cruisers, destroyers and submarines by 1928 (provided no change will be made in the meantime in the British and American programs) will be 1.00 for the United States, 1.27 for Britain and 0.66 for Japan. The ratio three years hence will, of course, have to be entirely re-estimated, if in the meanwhile the United States and Great Britain go ahead with the building of, respectively, eight and five cruisers.

Japan is confident that her building program for auxiliary ships will invite no adverse criticism at a coming international conference. Nevertheless she would not be loath to modify it if other leading naval powers would cooperate in establishing a reasonable ratio. She fears that France would not easily agree to a ratio satisfactory to Britain or America, for she has all along insisted that her safety requires a large fleet of auxiliary ships.

In the matter of land armament Japan has already taken steps in the right direction. In 1922 the Japanese Army adopted a plan under which

2,318 officers and 60,228 men were to be dismissed in three years. This plan satisfied few liberal critics. The present Cabinet, under the leadership of Viscount Kato, has been urging the abolition of seven divisions out of a total of twenty-one. The army has presented a counter-proposal to abolish four divisions. They will eventually arrive at a compromise.

Even if Kato's plan were not adopted the reduction of four divisions, as proposed by the army, is a signal movement toward the goal desired by the liberals of Japan.

To sum up, the coming armament conference will find Japan an interested onlooker rather than the center of criticism, or the "object of persecution," which some Japanese reactionaries thought she was at the Washington Conference. It will experience great difficulty in composing differences between France and England and among European nations in general and to a lesser degree between the United States and European nations. In such a situation Japan, represented by an able delegation, may play the rôle of harmonizer.

Japan's Expenditures Under Kato Cabinet

By Hector C. Bywater, *Baltimore Sun*, 17 September, 1924.—London, Sept. 1.—Today is the first anniversary of the great Japanese earthquake which devastated Tokio and Yokohama and killed or maimed nearly a quarter of a million people. Those who predicted that this terrible calamity would reduce Japan to political impotence for at least a decade now acknowledge their error. They did not make sufficient allowance for that curious blend of Oriental fatalism, moral resilience and abounding energy which is peculiar to the Japanese character.

So far as fundamental national policies are concerned, the effect of the earthquake has been negligible. Despite the appalling loss of life and property, Japan has not been permanently weakened. She has pruned her budget in the interests of reconstruction, but not at the expense of any service which she considers essential to the maintenance of her power and prestige. There has been no such "chastening of the national spirit," no such renunciation of imperialistic aims and ambitions as many onlookers in the western world seem to have anticipated.

In Japan's marvelous recovery from a disaster of the first magnitude we can discern one of the sources of her greatness. She is pressing on toward the goal which she believes Destiny to have appointed for her, and she is not to be halted or turned aside by any obstacle which courage and resolution can surmount.

The Japanese papers published last month a long list of economies which the Kato Cabinet intends to carry out. Beginning at the top, the Legislative Bureau, hitherto an important branch of the cabinet itself, is to be suppressed, together with the Colonial Bureau, the functions of both offices being transferred to other departments. The Government Printing Office is to close, and from now on all official printing—with the exception of paper money, will be done by contract.

In the Foreign Office there has been for many years past a well-organized intelligence division, to whose pioneer work more than one Japanese coup in the realm of diplomacy is attributable. It was proposed to abolish this service, but the Foreign Minister has made a strong protest and the "Johobu," as the intelligence branch is named, is likely to escape the ax.

Various bureaus of the Home Office, the Treasury and the Departments of Justice, Education, Agriculture and Communications are to be cut down in the interests of economy. Even the army is to be reduced, perhaps by as much as six or seven divisions. The only services not affected are the navy and the air force—in fact, the latter is to be expanded and improved.

So far as war preparedness is concerned, the earthquake has made little

difference to Japan. If anything, she is stronger today than she was twelve months ago. Apart from the loss of its oil reserves, her navy suffered scarcely any damage. One or two ships were wrecked, it is true, but these have since been replaced by units of equal or superior quality.

Yokosuka Navy Yard was ravaged by quake and fire, but it is now in course of reconstruction, and when completed it will be a larger and more efficient establishment than before. The oil lost by the destruction of tanks at this yard and at Yokohama is being replaced by supplies purchased abroad, and there are hopes that the wells of northern Saghalien, now undergoing intensive development, will eventually yield enough oil to meet the requirements of the navy.

The program of auxiliary warship construction, which was interrupted for a few months, is again in full swing. New cruisers, destroyers and submarines are building according to plan. A great deal of money is being spent in modernizing coastal defenses, especially in the vicinity of the straits between Japan and Korea. Fusan (in Korea) and the surrounding district has just been proclaimed a military zone, which indicates the construction of new forts.

Although, as noted above, the manpower of the army is to be reduced, the demobilization of several divisions will be compensated by improvements in technical equipment. Old artillery is being replaced by modern high-powered ordnance; tractors are taking the place of horses for the transport of guns; new tank battalions are coming into existence, and additional chemical warfare sections are being formed. The cost of these improvements will probably wipe out any saving which may be effected by the reduction in the number of divisions.

The development of war aviation is proceeding rapidly. War Office plans provide for the addition, within the next three years, of five flying corps to the six already available, at a cost of $15,000,000. During next year the navy will complete its great aerodome at Kasumigaura and organize new flying divisions at Kure, Sasebo and Omura. Furthermore, the government is considering schemes for the promotion of civil aviation, a strong impetus having been given to this movement by the arrival in Japan of American, French and British world flyers. Voluntary contributions to the air force fund are flowing into the treasury from all parts of the country, one Osaka business man having donated $50,000 for new machines.

In the Imperial Diet on July 15 General Nagaoka Gwaishi, urging greater preparedness for air warfare, drew a vivid picture of the havoc likely to be caused in Tokio, if the city were raided by a squadron of American planes such as those used by the United States world flyers on their recent visit. Machines of this type, he declared, could each carry a ton of poison gas, sufficient to annihilate all life over an area of many acres. Everything points to a great expansion of aviation in Japan within the near future.

Students of military affairs are well aware that the Japanese have not kept pace with recent progress abroad in respect of tactical methods and war material. The organization of their army, and still more, its equipment, is largely obsolete when judged by western standards. Much the same thing was true of the navy up to the last year or so. The fleet was overloaded with ships of no fighting value and money that was urgently needed for new vessels and modern equipment was spent in maintaining these useless craft.

The two powerful clans which dominate the army and navy, respectively, appear to have resisted any diminution in the numerical strength of these services on the ground that it would tend to curtail their political influence, but circumstances are compelling them to modify their attitude. One of the outstanding lessons of the World War was the futility of sending great masses of men into battle without a lavish supply of modern equipment.

Now, the Japanese Army of twenty-one divisions is said by experts to have only sufficient artillery of all calibers to equip eight or nine divisions organized on the French postwar system, while in tanks, chemical sections and aircraft it is still more deficient. This means that Japan's army, despite its imposing array of infantry, would inevitably suffer defeat if opposed to a western force inferior in numbers but superior in equipment.

Having at last digested this lesson, the Japanese military chiefs are now preparing to remodel their army on European lines by cutting out half a dozen divisions and replacing them by artillery, tanks, aircraft and so forth. In a few years' time, therefore, Japan as a military power will be more formidable than she has ever been, though the size of her standing army may show a considerable reduction.

For the reform of her navy, which is also in process, she has to thank the Washington agreement. This compact pledged her to discard ten major ships, which looked well enough on paper and helped to swell the battle fleet to an imposing total, though they added practically nothing to its combatant strength. With one exception they were mixed caliber ships of antiquated design—some dating from the Russo-Japanese war—but it took about 10,000 officers and sailors to man them and their upkeep cost millions every year.

Now that these vessels have gone, a large proportion of the money saved is being diverted to the building of new cruisers and submarines, the refitting of the battleships that remain with up-to-date gear, the manufacture of improved ammunition and torpedoes, and to naval experiments and research work, and so, in all likelihood, the ultimate result of the Washington treaty will be a substantial increase in the all-round fighting power of the Japanese Navy.

Having regard to the much smaller establishment now kept up as compared with the pretreaty fleet, and to the fact that the cuts in the navy budget made in 1922 and 1923 are smaller in the aggregate than the extraordinary credits voted to repair earthquake damage, it is evident that Japanese expenditure on naval armaments is almost, if not quite, as heavy today as it was three years ago, though the number of ships in the battle fleet proper has been halved. If the current votes for army, navy and air force were added together, the total would fall not far short of the corresponding figure for 1921.

The fate of several ships doomed under the Washington Treaty is described in the Tokio papers. On July 25 the battleship *Hizen* was sunk in the Bungo channel by gunfire and torpedoes, and on September 5 the battleships *Aki* and *Satsuma* are to be blown up by the guns of the fleet. Valuable lessons are anticipated from the bombardment of these ships, which in every case make their last plunge to the accompaniment of marine bands playing patriotic airs.

Increase in Japan's Air Force

Aviation, 8 September, 1924.—The Japanese Army reorganization program has been finally put in shape, says an Associated Press despatch dated Tokio, August 27.

It is authoritatively stated that the new plan will abolish four divisions and other minor units, resulting in a saving of 18,000,000 yen. Of this saving, 13,000,000 yen will be allotted to the establishment of twelve air squadrons, equally divided between pursuit, scout and bombing squadrons, a tank corps, anti-aircraft units, motor transport, schools of chemical warfare and research and a school for non-commissioned officers.

Naval authorities have agreed to an increase of twenty-eight squadrons and hope to secure the expansion at the regular session of the diet in December.

UNITED STATES

Navy Approves Reserve Plan for St. John's

Baltimore *Sun*, 5 September, 1924.—Establishment of a four-year naval reserve officers' course at St. John's College, Annapolis, yesterday was approved by the Navy Department.

The course will be offered during the school year, which will begin September 23, and will be given in only one other American institution—George Washington University, at Washington.

Arrangements were authorized at a conference attended by representatives of the Navy Department, Dr. Howard L. Hodgkins, dean of George Washington University, and the following from St. John's: Dr. Enoch B. Garey, president; Dr. Walter R. Agard, dean, and Capt. D. M. Garrison, head of the department of mathematics, who formerly was head of the Mathematics Department of the United States Naval Academy.

The purpose of the course, according to present plans, is to provide facilities for the training of naval reserve officers along lines adopted by the army in the Reserve Officers' Training Corps. Candidates will be enrolled as midshipmen in the Naval Reserve and at graduation will be commissioned ensigns in the reserve force.

A minimum of three hours of study a week in naval subjects will be required during the first year of the course, although the college will be free to give such an additional amount as they desire. Dr. Garey said considerably more time than this would be devoted to the course at St. John's. The work will be in addition to the regular curriculum followed by candidates for degrees.

Liberal credit for work done in naval subjects will be allowed by the college toward an academic degree. The course will be given by a department head and three assistants, to be provided by the Navy Department. The staff will be chosen from officers at the Naval Academy.

This year only members of the freshman class will be eligible for admittance to the course and the class will be limited to fifty men. During the experimental stage of the course provision is made for the consideration of resignations for cause at the end of the first year.

A $50 outfit of uniforms will be given by the Government to each student for use at drill and during summer training. Reserve midshipmen during their first year will receive no pay, but they will get the pay of their grade, $89 a month, during summer training.

The Navy Department is arranging to send students who enroll as reserve midshipmen on the regular summer cruise with midshipmen from the Naval Academy. At the end of this year they will be required to take this cruise or one of six weeks duration on ships of the scouting fleet. It is pointed out that the regular academy cruise, besides familiarizing students with navy life, offers exceptional opportunity for world travel.

The foreign travel element is emphasized in particular, since it affords an opportunity for students to visit various countries in all parts of the world at no personal expense. The educational and entertainment value of the trips is held by the department to be unexcelled.

The cruises are made during the months of June, July and August of each year, allowing students the month of September for visits to their homes or for such other purposes as they desire to use it.

After graduation and examination for commissions as ensigns in Class No. 2 of the Naval Reserve, officers will get two months' full pay a year and additional pay at the same rate when on active duty. To obtain this pay officers must attend thirty-six drills a year and a fifteen-day cruise. Those who do not attend drill, but who go on the cruise, will get fifteen days' pay.

That the course to be offered at St. John's will be particularly appealing because of the proximity of the school to the Naval Academy was the opinion expressed by Dr. Garey.

"As I see it," he continued, "the installation of these courses at St. John's and at George Washington is a matter of national importance. Educators all over the country should be interested in it and the Navy Department should realize in it a great service, since it will do the same thing for the Navy that has already been done for the Army.

"That is to say, it will bring the Navy close to the people. The Army has 150,000 boys in training—the cream of the country. They understand the Army's problems and in later life will be in a position to mould public opinion on these very things. They also may play a big part in combating improper influences which arise at times during emergency periods. The Navy needs just that thing and I believe these courses will answer the problem."

Dr. Garey, who fathered the movement and suggested it to the Navy Department for the first time in 1923, said that if the movement proves successful it probably will expand and be introduced into other colleges and universities in future years. To this end the Navy Department is lending the fullest cooperation for the success of the experimental units, he explained.

Condition of Naval Vessels

Washington *Post,* 14 September, 1924.—Reports coming to the Navy Department continue to describe the urgent necessity of repairs and alterations to vessels of the fleet, the need being cumulative and marking a continuous diminution of efficiency, with no prospect of relief, due to lack of funds adequately to meet the requirements.

All possible steps have been taken by the Navy Department in the expenditure of available repair funds, but this does nothing more than apportionment of those funds to the most needed conditions, leaving other work undone. It does not and can not make any pretense of keeping ships in a proper state of readiness.

Repairs to ships so have been neglected, on account of absence of funds, that the increase in demand in that respect far exceeds the amount that can be allotted for relief or restoration. A recent example is the cruiser *Cleveland,* belonging to the special service squadron operating in Central American waters, sent to the Boston navy yard for repairs, which now are found to be of such magnitude as to make it impossible to undertake the work with available funds. This shows and merely is an example of the run-down conditions of the ships.

Naval Legislation

Washington *Post,* 14 September, 1924.—Much important general and special legislation relating to the navy and marine corps remains over from the last session to be considered at the forthcoming short session, and possibly some new projects may be submitted by the Navy Department.

Among the old projects that again will be brought up is the bill to equalize promotion among line and staff officers. This bill now is in the course of being redrafted in the department to overcome objections that were raised during hearings before the congressional naval committees.

Another project, of utmost importance, is that authorizing the modernization of the coal-burning battleships *New York, Texas, Arkansas, Wyoming, Florida* and *Utah* by the installation of new oil-burning boilers and general overhaul of their machinery plants and by increasing the elevation of their guns. This project passed the House at the last session, and it came near going through the Senate on the last day of the session in June.

Other pending naval measures are the land bill, reserve bill, marine corps promotion bill and several other projects relating to the marine corps personnel.

The Diminished Estimates of the Navy

Work has continued during the past week in the Navy Department on the revision downward of the estimates for the naval establishment for the next fiscal year. The revision must be completed and in the possession of the director of the budget by September 15. While the effort is being applied to cut the departmental estimates by sixteen per cent, representing a sacrifice of nearly $60,000,000 from the amount regarded by the naval authorities as essential for the support of the various activities of the service, including maintenance of the fleet and the upkeep of ships with some regard for their efficient operation. The reduction imposed brings the original estimates from $346,000,000 to $290,000,000, but it is considered possible to present supplemental estimates, amounting to not more than $10,000,000, which would still leave an appreciable shortage of funds for adequate needs of the Navy ashore and afloat. This supplemental estimate must, however, be fortified by all sorts of statements to show the dire necessity for the additional provision, not, by any means, a difficult task for the department people; rather the ordeal, for it is quite that, is to select what is relatively most urgent to be met by the comparative pittance. The President has already signified, in no uncertain language, that the maximum limit of appropriations that may be allotted to the naval establishment is $30,000,000. Therefore, the supplemental estimate will not go beyond that prescribed figure.

If the Navy is permitted to obtain the sum of $300,000,000 net for expenditure during the year 1925-26, it will be an increase over the net appropriation for the present fiscal year, which amounted to $276,395,794; but it is not overlooked that this sum left undone a vast quantity of repair and maintenance work in ships, to say nothing of the omission of practically all major and most minor alterations to vessels. The result has been disastrous, and the prospects for the next fiscal year are no better. Much that should be done this year can not be done, as is shown by the instructions lately issued to the navy yards and to those with the fleet to avoid every possible project that can be ignored without serious impairment of the fleet. The total of the naval estimates represents such a reduction from the needs, as shown to the authorities, that it looks as if additional ships would have to be placed out of commission. It is made known that the present intention of the naval officials is to carry out the original plans for a cruise to Australia, but at one time that event appeared to be in jeopardy.

It seems out of the question to carry the subject to the White House. President Coolidge's decision has been made; it places a definite limitation upon ultimate appropriations for the next fiscal year, whether or not the needs of the service have been communicated to him by those responsible for the maintenance of the efficiency of the Navy, as compared with the information he is believed to have acquired from those whose principal function is to make a demonstration in so-called economy. It is not believed that any revelation concerning the steady decline of the fleet would make any impression on the President, whose policy has been very clearly expressed in terms that discourage any attempt to secure modification of the program that involves the expenditure of the public funds for the operation of the United States Government. There is as little reason to expect that Congress, itself, will go much, if any, above the presidential limitation of naval funds for the next fiscal year. To be sure, the results of the November elections will be known by the time the estimates come before the House Appropriations Committee, but it is not considered that politics, either

before or after the votes are cast, will have any influence one way or the other. Neither will a change in party control in either the House or Senate, which would not occur until the beginning of the Sixty-ninth Congress after March 4 and this aside from the fact that one party might be more liberal than the other, when it comes to providing for the naval force. All that can be done is to make the best of a deplorable situation and allow many great and urgent needs of the service to accumulate, to be met by increased appropriations at some future date with its full significance and effect of actual extravagance on account of the postponement.

Greater Air Fleet, Aim of Coolidge, as Ships Pass Out

Washington *Star*, 16 September, 1924.—So impressed is President Coolidge with the advancement in aviation and its use in time of war that he was represented today as doubting very much the advisability of greatly increasing naval appropriations. The President, it was stated, believes there is more logic in the suggestion for increasing appropriations for developing the Army and Navy aviation to figure in future warfare than there is in increasing appropriations for the battleships, which must necessarily become obsolete in a very few years.

The President's views became known at the White House today, while speculation was still rife as to what lay behind Secretary of the Navy Wilbur's hurried departure for Washington from the West yesterday. Today he was speeding East with the expectation that he would take part in Friday's cabinet meeting.

It was explained here, after receipt of the news that Secretary Wilbur had left San Diego yesterday in an airplane to catch a fast train for the East, that while there was no special significance in his hurried return to Washington, it was desired that he be here to confer with the President regarding the budget allowance for the Navy next year.

It was stated today that the President is greatly impressed with the significance of the round-the-world-flight, and since his talk with the flyers who accomplished this feat and those who planned it he is satisfied that this world flight clearly demonstrates the future ability to carry on efficient and effective warfare in the air.

In this connection the President is said to have given the impression that he is inclined to feel that aviation has advanced so greatly during the past few years and that its future is so promising that battleships are losing the formidable place they once occupied.

The President was represented today as having expressed the opinion that aviation has so far surpassed certain features of battleship warfare that it would be impossible at this time to transport troops across the ocean, as was done in 1918.

A spokesman for the President indicated today that for this reason it is very doubtful if the President will agree to an increase in naval appropriations for the next fiscal year over the amount approved finally by the Budget Bureau. Two questions are involved that the President is known to consider as being very vital.

One is whether or not the people of the United States want to spend any great amount of money on ships that must ultimately be scrapped, or whether they would not rather expend this additional money on increasing the air strength of the Army and Navy. The President also is known to understand the methods generally adopted by the Army and Navy in obtaining increased appropriations.

It was said that the President has frequently read about the Navy being far below the standard and ready to sink oblivion, and that the Army is far below what it should be and would be wiped off the face of the earth in time of war, but he is not great impressed with either of the statements.

He has information which causes him to believe that the Navy at the present time is in what could be termed a good condition; that it is well manned, that the equipment is above the average and that the ships and its men can shoot better than ever before. He wants the Navy to have an adequate appropriation.

He also wants to see the policy of the budget maintained. He is personally responsible for this business agency of the government and he has no intention of committing an act that would tend to break down the budget's usefulness or its established policy. Neither has he the intention of permitting any of the departments under him to bring about such a breakdown of the budget. In his opinion if the budget is to become ineffective and its policy to be disordered that will remain for Congress to do and not the Executive branch of the government.

The President's views regarding future expenditures for the Navy and aviation were made following inquiries about the President's attitude toward the proposed gun elevation on American battleships, and the President, while determined to have the rights of this country under the arms conference treaty retained, makes no secret of the fact that in his present state of mind he can see no necessity for any great extra expense.

On the other hand, the President is known to be very enthusiastic about the future possibilities of aviation. Only yesterday he sent to the budget for figures showing what has been appropriated for aviation for the present year, and, these figures, according to the President's spokesman, show that the United States during the current year is spending more on aviation than any country in the world, unless it is France.

The total as reported to the President is $32,174.000. Of this amount, $12,435,000 is for the Army, $15,150,000 for the Navy, $450.000 for the National Advisory Committee for Aeronautics, and $2,750,000 for the Post Office Department. These figures, it is explained, do not include the compensation paid the aviation personnel of the several departments operating aircraft.

The White House said that the President expects to talk with various heads of the Army and Navy and those engaged in the development of aviation before he reaches some definite conclusion. It was stated that this question was by no means the reason for his hurry call to Secretary of the Navy Wilbur to return to Washington from California. The White House thinks that the summons as reported in the papers today was exaggerated and that there is nothing serious or important pending. The President merely wanted the Secreary of the Navy to be on hand to confer with him regarding the general routine of his department and on a number of important matters that are pending.

It is assumed, in view of Mr. Wilbur's return, that, with a view to expediting the preparation of budget figures for the December session of Congress, the question of the budget bureau's reported intention to cut the Navy's estimates for the next fiscal year from seventeen to twenty per cent will be threshed out at the cabinet meeting.

MERCHANT MARINE

Our Merchant Marine's Wage Burden

Literary Digest, 6 September, 1924.—Among the "handicaps and disabilities" under which the American Merchant Marine is operating, a serious one is high wages, thinks *American Shipping*, New York, whose editor furnishes us with a comparative table showing the pay of our own and other seamen. Ours receive the highest by far, and he advises that "some extra compensating factor be sought" to "offset the operating disadvantage." Calling the problem of maintaining our footing on the seas

"a many-sided one," he tells us that it "seems possible of a satisfactory solution only through a scheme of governmental aid that will embrace the whole," wages included; but *The Nautical Gazette*, New York, studying the same figures, thinks them "interesting in view of the tendency to magnify out of all proportion the handicap placed upon American ship operation by the wage differential," and tells us:

Wages constitute a comparatively small part of the operating costs, it being estimated that approximately only twelve cents out of every dollar spent for the entire operation of a vessel is paid for wages, while thirty cents go for fuel and twenty-five cents for port charges. If there be any modicum of truth in the contention that the high wages paid on Shipping Board vessels are largely responsible for the board's heavy losses, then the board has nobody but itself to blame. It has raised the wage scale and the standard of living on its vessels higher than those on any other ships in the world; even higher than those on private American ships, for private owners can not afford to keep pace with the wage advances made by the board. In this respect the board has rendered profitable operation more difficult for private shipowners, as it is well-nigh impossible to keep a crew contented on a privately owned vessel when the lure of higher wages on government ships is kept dangling before the men's eyes. Although nobody will deny the right of any man to an honest day's pay for an honest day's work, it should be remembered that a highly paid crew is not necessarily a highly efficient crew, but if through its ability to pay high wages the board has secured a monopoly of the best men, the board should keep its wage scale more in line with that which private owners can afford to pay, in order that it might be possible for them also to secure good crews for the better handling of their ships.

Fortunately, as *The Nautical Gazette* goes on to say, "the wage scale is not the final test of a ship's competitive ability." The "present supremacy of the British mercantile marine is unquestionable," yet—

The table shows that the wages on a British ship are higher than those on Norwegian, Dutch and French vessels, whereas, if the low wage scale were the determining factor in the success of a merchant marine, Norway, with the lowest scale, would hold first place. Efficiency is the first essential of low operating costs. In view of these facts it is somewhat surprising that steamship men should hesitate to endorse the Dieselization program adopted by the Shipping Board. An official of the American Steamship Owners' Association is credited with the statement that the conversion of government steamers into motor ships will not solve our mercantile marine problem, for, although American motor ships will be better able than steamers to compete with foreign vessels, they will still suffer from the same wage handicap as at present. It is not a few hundred dollars more on the monthly pay-roll that will prevent American motor ships from becoming competitive, but the indifferent attitude displayed by some of the operators toward the program.

But a vessel is not always sailing the seas, and, as we are told,

One effective method of reducing ship-operation costs is to cut the labor charges incident to a vessel's stay in port. The importance of this economy is not fully recognized, yet it looms up large when it is remembered that the cost of loading a ton of cargo in an American port and unloading it in a foreign port is from one tenth to one quarter the total cost of transporting it across the ocean. If the stevedoring charges can be reduced, the operating costs will be reduced proportionately. In Seattle a definite forward movement in this direction has been taken by the Waterfront Employers' organization, which has embarked on a campaign to reduce accidents among longshoremen. Longshoring, as the organization points out, is naturally a hazardous occupation, but both longshoremen and employers in that city

have come to believe that many of the accidents can be prevented. A competent, trained and experienced safety engineer has been engaged to organize safety work, study the causes of accidents, and act in an advisory capacity as a safety counsel, in an endeavor to prevent accidents through a system of education, inspection and supervision. Through the adoption of a few simple policies safe habits of work will be instituted.

Accidents are increasingly costly, and by way of showing the expense they entail, the magazine cites the case of Seattle:

Some idea of the need for action along this line can be gathered from the increasing cost of accidents. For example, taking 10,000 hours of longshore labor as a unit, on the Seattle waterfront the wages in 1913 were 45 cents, the rate of insurance 2.5 per cent and the cost of insurance $112.50. In 1917 the wages had increased to 65 cents, the rate of insurance to 3.3 per cent and the cost of insurance to $214.50. In June of this year the wages were 90 cents, the rate of insurance had increased to 4.565 per cent and the cost of insurance had jumped to $410 85. Last month the wages were unaltered, but the rate of insurance had increased to 6.8 per cent and the cost of insurance to $612. In other words, wages have doubled but insurance costs have increased more than five times. Or, it may be said that a premium of 6.8 per cent of the pay roll is practically one fourteenth, which means that every fourteenth longshoreman is on the injured list. This is a human and economic waste that is adding greatly to the cost of ship operation, and shipowners, stevedores and longshoremen at all ports should cooperate to reduce it to a minimum.

The comparative table on which the discussion of wages is based shows that American wage scales "range from 48.8 per cent to 215 per cent higher than the wages paid on foreign ships," taking an 8,800-deadweight-ton coal-burning steamship as the standard. Pay is reckoned by the month, and "all values have been converted into United States dollars."

The table given below is made up of selections from *The Nautical Gazette's* elaborate comparative tabulation of foreign and American wage-scales.

COMPARATIVE MONTHLY PAY ON AN 8,800-TON SHIP

Employee	*Great Britain*	*Norway*	*Holland*	*Japan*	*Sweden*	*France*	*U. S. Shipping Board*
First Mate.....	$92.00	$61.86	$105.52	$101.00	$110.26	$73.94	$185.00
Boatswain	46.00	26.98	42.87	44.44	46.80	24.33	75.00
Able Seaman.....	39.82	24.52	37.38	18.78	39.57	20.85	62.50
Ordinary Seaman..	27.37	13.14	.....	8.08	32.44	.....	47.50
Radio Operator.....	65.71	27.68	105.00	58.58	56.71	105.00	105.00
Chief Engineer.....	105.04	77.64	139.80	137.36	149.04	121.21	260.00
Fireman	41.61	24.35	39.14	20.87	39.56	22.75	67.50
Chief Steward.....	59.14	46.08	27.96	38.34	84.41	31.60	120.00
Ave. Total Crew..	$1,782.71	$1,100.14	$1,623.33	$1,865.53	$1,820.59	$1,318.85	$3,466.00

High Speeds at Sea

The Engineer, 5 September, 1924.—When landsmen speak of an aeroplane as having travelled at 150 miles an hour, or a railway train at seventy miles an hour, the significance of such figures is at once apparent to everybody, sailors included; but when the sailor, on his part, refers with pride to the number of knots logged by some swift ship in the course of a day's run, comparatively few landsmen are able to grasp the full meaning of the achievement. Notable speed performances at sea do not, therefore, impress the public's imagination quite so deeply as similar records established on land or in the air, where the velocity is measured in miles. True, the difference between an admiralty knot and a statute mile—6 080 feet and 5,280 feet respectively—is not very great, but it becomes considerable when we

are dealing with long runs or very high speeds, as the case may be. Thus, the news that the *Mauretania,* on her latest homeward passage, covered the 3,198 miles between Ambrose lightship and Cherbourg at an average speed of 26¼ knots, means that the liner maintained throughout the voyage a speed of more than thirty miles an hour. It should not be overlooked that this wonderful voyage was made by a ship which is now in her seventeenth year. Except that her boilers have been converted for oil fuel and her turbines partly re-bladed, the *Mauretania* remains unaltered. Since her completion she has been almost constantly in service, and probably has a greater mileage to her credit than any other vessel afloat; yet today, when she is already nearing the end of that twenty-year period of "useful life" which is assigned to the average passenger liner, we find her easily surpassing the highest speed she made on her earliest voyages. We can recall no finer example of the British genius for shipbuilding and marine engineering. During the last five hours of the passage to Cherbourg her speed averaged 28¼ knots, or more than 32½ miles an hour. That she could do even better, if it were worth while to force the machinery, was shown by the first run made after the re-blading of the turbines, when for a time she was moving through the water at the extraordinary rate of 35½ miles an hour. The only other vessels of large tonnage able to travel at such a speed are the British battle cruisers *Hood, Renown* and *Repulse;* but, whereas they are rarely driven at anything like full power, the *Mauretania* has been running for many years on a time-table designed with a view to accomplishing the swiftest transatlantic crossing, and her machinery is, therefore, normally working at high pressure. We understand that she has averaged 25½ knots for twenty-seven consecutive voyages across the Atlantic, during which she must have encountered many varieties of weather —good, bad and indifferent. In this respect she has more than fulfilled the terms of the agreement between the government and the Cunard Steamship Company in 1904, under which the *Mauretania* and her ill-starred sister *Lusitania* were built, and which stipulated for an average sea speed in moderate weather of not less than 24½ knots.

That the *Mauretania* represents the last word in high-speed ocean travel, no engineer or naval architect imagines for a moment. While it might be difficult, perhaps impossible, to improve on the lines of the hull, which are modeled with unusual care after an exhaustive series of tank experiments, turbine machinery of higher power and increased efficiency could be built today within the limits of weight and space available for the original plant. From the engineer's point of view it is a matter for regret that no demand should have arisen for the construction of an ocean liner to excel the *Mauretania* in speed, but the design of such vessels is governed by considerations other than fast steaming. High speed at sea is an expensive luxury, and unless the cost thereof can be balanced in other ways the shipowner naturally prefers to invest his capital in ships which are more remarkable for economy in fuel consumption than for swiftness of passage. For this reason practically all the ocean liners built since the war have been designed with moderate engine power. The *Berengaria,* though her gross tonnage is 22,000 more than that of the *Mauretania,* has machinery developing approximately the same power, and neither the *Majestic* nor the *Leviathan,* the two largest vessels afloat, are remarkable for very fast steaming. The former, of 56,551 tons gross, has engines of 66,000 shaft horse-power; the American ship, of 54,282 tons gross, has had her machinery modified to such an extent that her present service speed—according to *Brassey*—is only 21 knots, which is considerably lower than the original German design provided for. It was announced three years ago that the United States Shipping Board was preparing plans for two Atlantic liners of unexampled dimensions and speed. These ships were to be 1,000 feet in

length and to have a sea speed of 30 knots, which would enable them to make the crossing in four days. This project, however, appears to have fallen through, as everyone familiar with the economics of shipping was convinced it would. Apart from the high initial cost of such vessels, the fuel and maintenance charges would have reached a staggering figure, and it is doubtful whether a full passenger list on every voyage all the year round would have enabled them to be operated at a profit. Taking the twenty-six largest steamers now afloat, we find the mean of their speeds to be no more than 19.3 knots. Only eight are designed for more than 20 knots, and only four for speeds of 24 knots and upward. Clearly, therefore, the demand for high speeds in the mercantile marine is very limited, and it looks as if the *Mauretania's* possession of the blue riband of the Atlantic would remain unchallenged for years to come. It would, indeed, be remarkable if the completion of twenty years of service found her still the swiftest merchant ship in the world, yet that may well prove to be the case.

In the design of naval vessels economy of operation is of secondary importance, while the tactical and strategic value of high mobility is unquestioned. There has been, in consequence, a steady rise in the speed of such vessels during and since the war. The battle cruiser *Tiger,* laid down in 1912, has machinery of 85,000 shaft horse-power for a speed of 28 knots. Four years later Sir E. T. d'Eyncourt planned the *Hood,* in which the engine power was increased to 144,000 shaft horsepower, and the legend speed to 31 knots. On the measured mile this great ship attained 32 knots—36.8 miles an hour—in spite of her displacement being 1,000 tons above the normal. No other major ship of any navy has equalled this performance. The construction of battle cruisers having been arrested by international treaty, the field of development in fast steaming is now confined to light cruisers and destroyers. As regards the former type, the swiftest vessels afloat appear to be those of the U. S. *Omaha* class, one of which, the *Detroit,* has traversed the measured mile at a speed of 35 knots—40.3 miles an hour—with her engines generating 97,375 shaft horsepower. No prewar cruiser came within seven knots of this performance. The trial runs of our new light cruisers, *Emerald* and *Enterprise,* will be awaited with interest; they are designed for a speed of 33 knots when in light condition, with their machinery developing 80,000 shaft horsepower. The French cruiser *Lamotte-Picquet,* which is to be put through her paces during the autumn, has engines of 96,000 shaft horsepower for 34 knots, but her builders confidently anticipate that 116,000 shaft horsepower and 36 knots will be realized. While nothing is known about the details of our new *County* cruisers, it will be surprising if they do not equal in engine power the swiftest vessels now building or projected abroad. The world's record for speed in the destroyer class is still held, we believe by H. M. S. *Tyrian,* which Messrs. Yarrow completed nearly five years ago. On trial this vessel reached the astonishing speed of 39.72 knots, equivalent to 45½ miles an hour. Such a velocity would have seemed incredible to the older generation of marine engineers, but it is quite likely to be surpassed by destroyers now on the stocks or about to be laid down in this country and on the continent.

ENGINEERING

Water-Cooled Furnaces Make Records at Hell Gate

By W. E. Caldwell, *Power,* 2 September, 1924.—In the settings of the twelve boilers comprising the initial installation at Hell Gate Station, a double-ended furnace is employed with a short stoker firing at each end. At the time of preparing this layout the short stoker had reached a high state of development, while the long stoker was still in the experimental

stage, which consideration prompted the design adopted. The stokers have a length of seventeen tuyeres and a width of fourteen retorts at each end of the boiler, making a total of twenty-eight retorts per boiler. The boilers are twenty tubes high with the superheater in an interdeck location, that is, with six rows of tubes between the superheater and the furnace. No

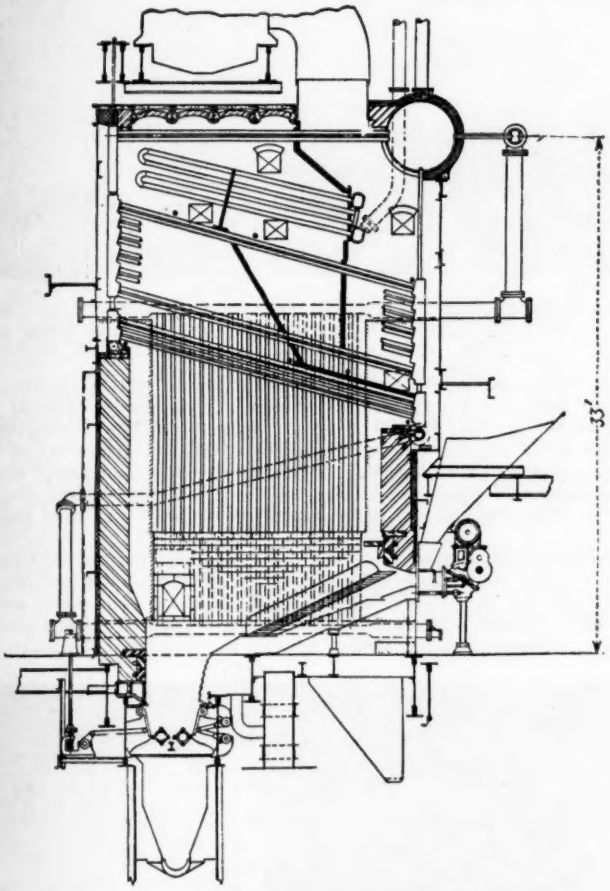


FIG. 1—CROSS-SECTION OF HELL GATE FURNACE WITH WATER-COOLED SIDE WALLS

economizers were installed in the original installation, although room was provided for future insertion should conditions warrant it. Each boiler is equipped with an induced-draft fan driven by an alternating-current motor of the brush shifting type.

The foregoing general description is included for comparison with the more recent installation. For a more detailed description of the original boilers and their settings, consult the May 9, 1922, issue of *Power*.

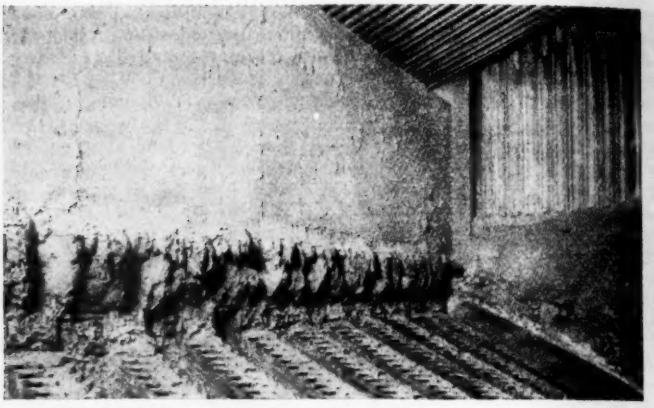


FIG. 2—INTERIOR OF FURNACE AFTER SEVERAL MONTHS' OPERATION, SHOWING FRONT WALL AND FIN TUBES OF SIDE WALL

When load conditions necessitated an increase in station capacity, turbo-generator unit No. 5 was installed, together with three additional boilers known as No. 51, No. 52 and No. 53. These three new boilers, while of the same make as the original installation, differed somewhat in design, baffling and superheater location. Perhaps the most pronounced departure from conventional practice was the installation of side-wall cooling tubes in the furnaces, the general arrangement of which is indicated in Figs. 1 and 4.

These side walls consist of 4-inch tubes arranged vertically on each side of the furnace and spaced on 7-inch centers. Each tube has two longitudinal steel fins welded on it diametrically opposite each other, and when placed in the boiler furnace, the fins overlap, thus presenting a continuous water-cooled surface to the radiant heat of the furnace. The lower portion

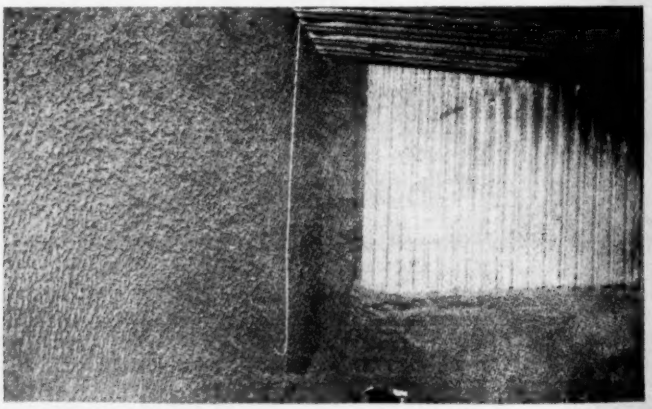


FIG. 3—INTERIOR OF FURNACE, SHOWING REAR WALL AND SIDE WALL AFTER SEVERAL MONTHS' OPERATION

of the tube is covered by fireclay tile for a short distance above the stoker. This extends along a horizontal line the entire length of the furnace.

The water in the tubes forms a part of the regular boiler circulation, the lower end of the tubes being connected by headers leading to the mud drum. The upper end of the side-wall tubes are connected to a header, which in turn discharges into the boiler drum through a special set of nipples and headers in front of the drum.

The water-cooled side walls not only replace practically all the brickwork in the side walls, but afford considerable protection to the front and rear walls by absorbing the heat which they reflect and thus lowering the temperature of the face of the wall.

To anyone familiar with the difficulties of brickwork maintenance, the logic of the water-cooled walls is at once evident. Not only is the problem of brickwork maintenance in large boiler settlings an item of considerable expense, but the loss of capacity of steam-generating equipment rendered idle by necessary repair periods is of even greater importance. In the older

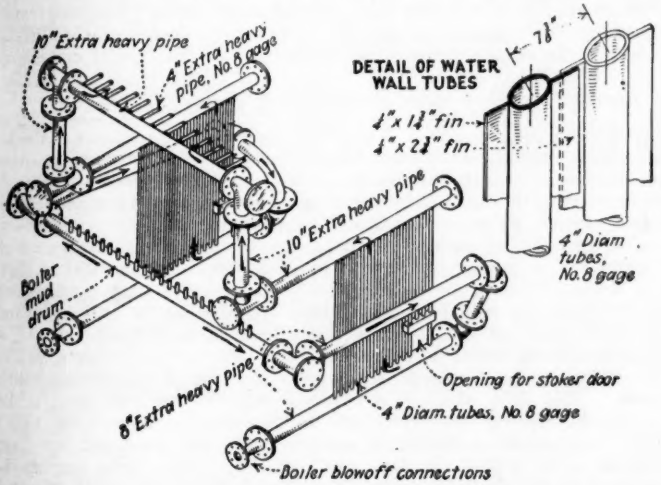

10" Extra heavy pipe
4" Extra heavy pipe, No. 8 gage
DETAIL OF WATER WALL TUBES
7⅞"
4" x 1¾" fin
4" x 2¾" fin
10" Extra heavy pipe
4" Diam. tubes, No. 8 gage
Boiler mud drum
8" Extra heavy pipe
Opening for stoker door
4" Diam. tubes, No. 8 gage
Boiler blowoff connections

FIG. 4—ISOMETRIC SKETCHES SHOWING DETAIL OF FIN TUBES AND METHOD OF CONNECTING INTO BOILER CIRCULATION

plants in which smaller boilers and furnaces are employed, it is not unusual to complete a major brickwork repair job over a week-end or holiday period. With the larger settings several days are required, and each boiler represents a larger percentage of the total steaming capacity than it did in the older stations having a larger number of small boilers.

The furnaces in these new boilers are of the single-ended type as contrasted with the double-fired furnaces of the original installation. The long stoker had passed through the experimental stage since the installation of the first stokers at Hell Gate, and while it was not in the finished state of its predecessor it possessed certain advantages that seemed to outweigh any objections on this account. Stokers of the same make were installed, having a length of thirty-three tuyeres and a width of fourteen retorts and employing double-roll clinker grinders as in the original installation, but with certain minor changes. Many other changes, found advisable from past experience, were made in the air piping and arrangement. The super-

heaters are of the straight convection type and are located between the first and second pass, as shown in Fig. 1. These boilers are provided with economizers. The induced-draft equipment is the exact duplicate of that employed on the older installation. The new boilers have now been in service several months, and from both a performance and maintenance viewpoint the results have been very gratifying.

Fig. 2 is a photograph showing the interior of the furnace after several months' operation. The water-cooled tubes and fins had not been cleaned at the time this photograph was taken. It may be noted that the front wall also appears to be in an excellent condition except for a very small zone adjacent to the ram boxes.

Fig. 3 shows the interior of the furnace looking toward the rear wall and side walls. The clean appearance of the side-wall tubes and rear wall contrasts sharply with the clinker accumulations which are usually seen adhering to the brick walls in the older settings.

From indications, it is evident that this new type of setting will increase the life of the front and rear walls two or three times. The only evidence of deterioration has been on the tile covering the lower part of the side-wall tubes. In future designs the elimination of this tile is contemplated.

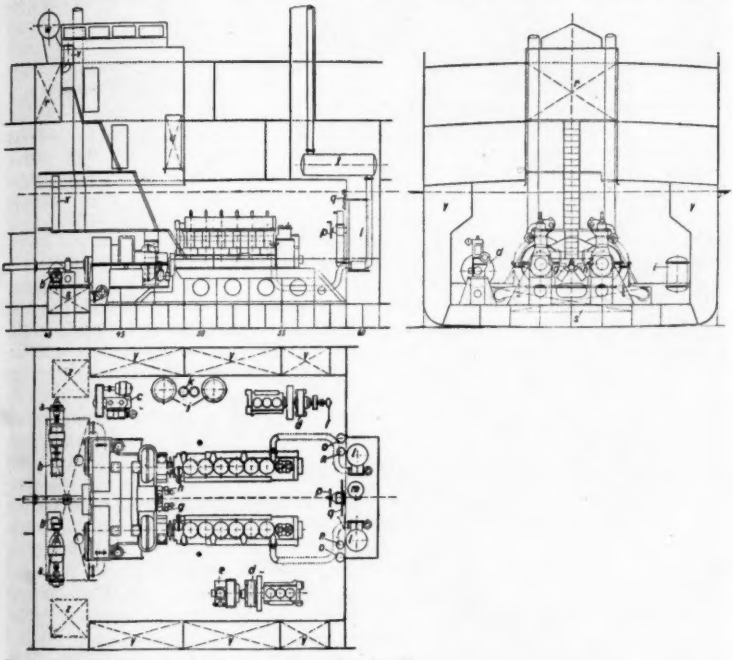
The First Motorship with Diesel-Fluid Drive

The Marine Engineer and Motorship Builder, August, 1924.—Much has been written recently with regard to the possibility of propelling ships by Diesel engines in which the drive is not transmitted directly to the shaft. In connection with this indirect transmission, use may be made either of so-called electric drive in which the prime mover generates electricity in dynamos, the current obtained being taken by propelling motors which in turn drive the propeller, or use can be made of direct mechanical gearing, or the drive of the prime movers can be transmitted to the propellers by means of hydraulic transformers. There are running, at present, examples of all three types of this drive mentioned above, and the latest and most interesting arrival in this field of transmitted drive is the motor ship *Vulcan* which visited some northeast coast ports last month for demonstrational purposes. This ship, which is a cargo vessel of 2,000 tons d.w., is driven by a single propeller which obtains its rotational energy from two six-cylinder, four-stroke cycle Diesel engines of a type developed for German submarine work during the late war, the drive upon these engines being transmitted to the shaft by means of a special fluid-mechanical drive which has been developed by the Vulcan-Werke at Hamburg.

Length b.p.	70·00 m. =	229 ft. 8 in.
Beam	10·98 m. =	36 ft. 0¼ in.
Height, main deck	5·195 m. =	17 ft. 0½ in.
Height, quarter deck	6·395 m. =	21 ft.
Draught, load	4·060 m. =	16 ft. 3¾ in.
Power	620 s.h.p.	
Speed	9·5 knots.	

She has been built purely for demonstrational purposes to the builders' account and, as will be seen, she is of modified raised quarter-deck type with a short forecastle, well, long bridge having a hold in the fore 'tween decks, which is at present very well equipped as a lecture theater, and a short low poop containing a store room and the steering engine. Provision is made for carrying extra ballast and fresh water in tanks built up between the aft hatch and the poop and the bridge erection aft and forward of the hatch respectively. In spite of the fact that the *Vulcan* is an experimental ship, her deck equipment and cargo-handling gear are remarkably complete. They are electric throughout and consist of an electric windlass on the fore-

castle, one which serving the forward hatch, two serving No. 2 hatch and two the aft hatch. The steering gear is entirely electric; the wheel on the bridge operates by means of shafting the control gear to a motor situated aft in the steering gear house which in turn operates a toothed quadrant through a worm and gear wheel, the worm being lubricated by a little pump piston driven off the main motor shaft. The control gear for the steering motor is situated in a recess at the port aft end of the chart house, protected from the weather by a teak door, and the gear itself is certainly noteworthy by virtue of its smoothness of running. A curious feature



Reproduced from "Werft Reederei Hafen."

MACHINERY ARRANGEMENT OF M. S. "VULCAN"

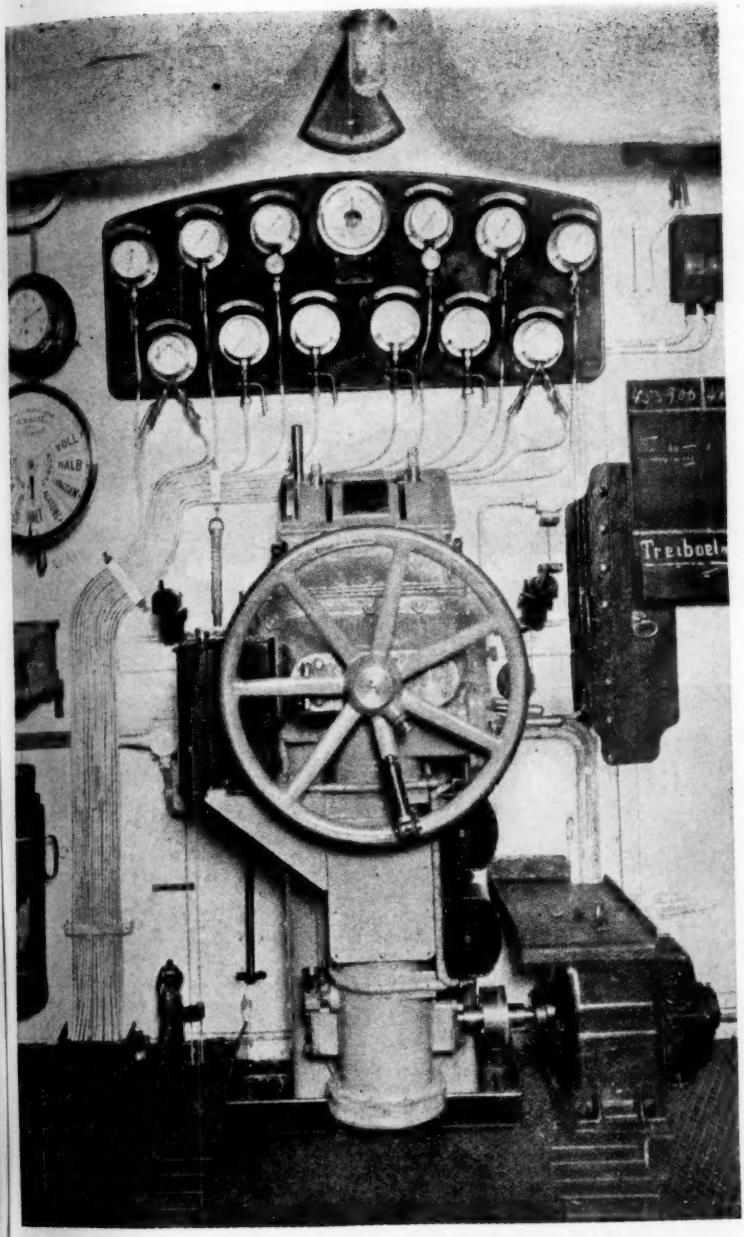
KEY TO LETTERING

a Cooling water and ballast pump.
b Oil circulating and lubricating oil pump.
c Bilge, closet, wash deck and fire-extinguishing pump.
d D. C. dynamo with motor drive.
e Auxiliary compressor.
f Fuel oil transfer pump.
g Bilge pump.
h Closet pump.
i Lubricating oil cooler.
k Oil filter.
l Exhaust gas boiler for heating the ship.
m Coke boiler.
n Injection air bottle.
o Starting air bottle.
p Distributing wheel.
q Pressure gauge board.
r Oil supply tank.
s Oil tank below engine.
t Exhaust gas boiler.
u Driving fuel daily supply tank.
v Filter for circulation pump.
w Closet tank.
x Switch board.
y Fuel oil bunker.
z Reserve lubricating oil tank.

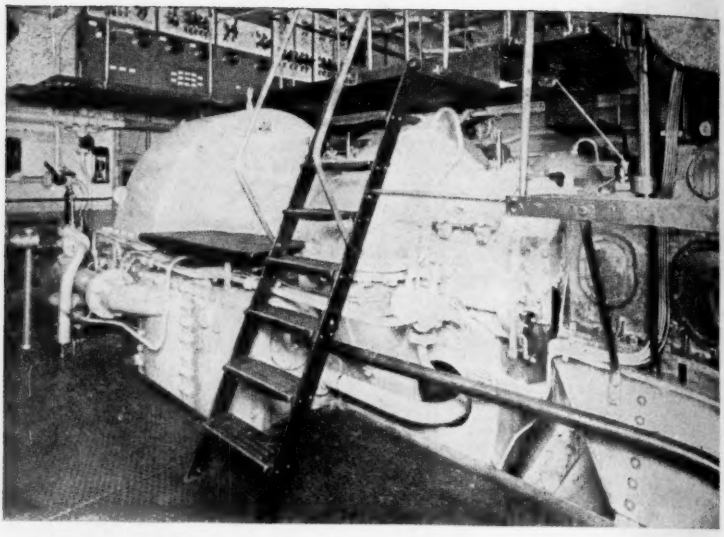
of the vessel's profile, is the funnel, which is square in section and takes the exhaust from the various main and auxiliary engines below.

Before proceeding to an actual description of the Vulcan-Föttinger clutch, it may be of interest to say a few words in connection with the arrangement of machinery in the engine-room itself, but in assessing any values to the system as a whole it should be remembered that the engines at present fitted in the *Vulcan* were neither designed nor built especially for their work, since they are ex-submarine engines which have been put in to demonstrate the working capacity of the gearing. It is not necessary, therefore, to quote any figures anent the fuel consumption of the engines, although as far as we could gather this was quite low, while the engines themselves have proved quite efficient for their job. As the general arrangement of machinery above shows, the two prime movers are geared to a single shaft through the clutch and gearing. These engines, which are rated at about 300 s.h.p. each at 300 r.p.m., are six-cylinder four-stroke cycle non-reversible units having a cylinder diameter of 350 mm. and a stroke of the same amount. Control for each of these engines is arranged at the forward end of the engine room, and control for the whole plant is centered in the forward bulkhead. The main engines drive their own fuel pumps. Normally both engines are running, but if necessary the ship can be driven on one engine only. On the main control panel there is one control, hand or electric, for the pump operating the hydraulic clutches, and one lever to control the speed of both engines; if one engine is for any reason cut out disconnection has to be made on the pedestal itself. The auxiliary machinery is all electrically driven, and for electric generating purposes there are two units generating direct current at 220 volts and driven by three-cylinder four-stroke cycle solid injection M.A.N. Diesel engines of standard type similar to that which we described on page 265 of our July issue. These engines are rated at 60 b.h.p. each at 400 r.p.m., and the starboard unit is coupled also to an auxiliary compressor for charging starting air bottles. For lighting purposes, the current is transformed down to 110 volts by means of a rotary converter. Against the aft bulkhead are arranged on either side of the shaft a motor-driven cooling water and ballast pump, and an oil circulating and lubricating oil pump. On the port side of the engine room is a motor-driven bilge and wash-deck pump and two vertical lubricating oil coolers. Fuel oil bunkers are arranged along each side of the engine room, and in a forward extension are two small exhaust gas boilers for ship-heating purposes. It will thus be seen that the engine-room arrangement is very compact and cannot certainly be criticized on the score of complication.

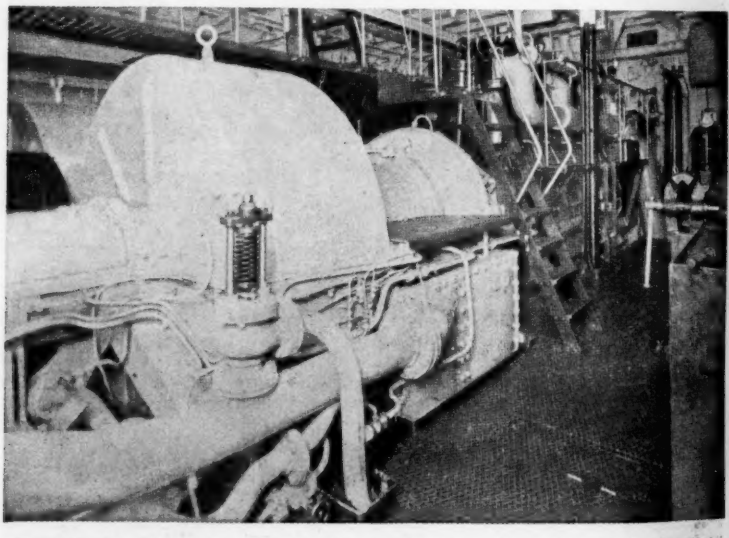
Chief interest in the engine room centers, of course, round the clutches and gearing. These consist, as will be seen, of an ahead and an astern coupling and a toothed pinion in connection with one of the main prime movers. The pinion is hollow, and through it runs the main prime mover shaft extension, which is rigidly connected in the ahead coupling to a wheel, opposite which is another wheel attached to the pinion. The driving medium is lubricating oil under pressure, which causes the driven member forward of the driving member to rotate and to drive the pinion which gears with the main gear wheel. These ahead clutches are arranged at the forward end of the pinions, and the astern clutches, which are similar in construction and principle of operation, except for the interposition between driving and driven blades of a number of fixed vanes which give reverse direction of rotation, are at the aft end of the pinions. The axial pressure of the oil balances the thrust of the single helical gearing, and there is a Michell thrust block at the forward end of the main gear wheel. The astern coupling is smaller than the ahead



CONTROL FOR ENGINES, ELECTRIC CONTROL TO CLUTCH, AND STAND-BY HANDWHEEL



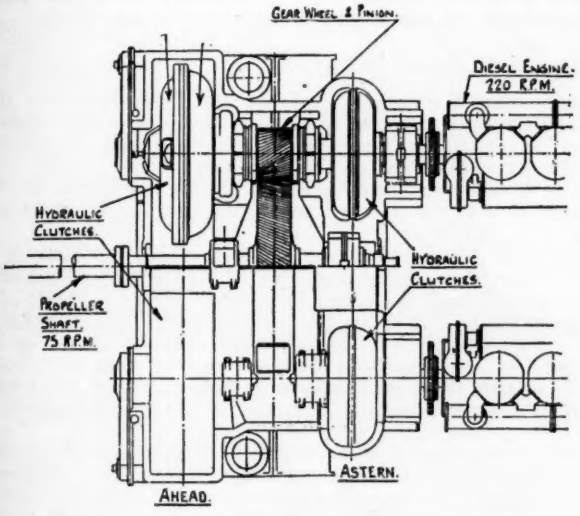
THE HYDRAULIC GEAR FROM FORWARD, SHOWING AHEAD AND ASTERN COUPLINGS



THE HYDRAULIC GEAR FROM AFT. AHEAD COUPLING IN THE FOREGROUND

coupling owing to the fact that only sixty-five per cent of the maximum ahead power is used for running astern. The gearing and the clutches are built together, forming one complete unit in a common cast-iron casing. The hydraulic clutches are of cast iron. The pinions and the wheel rim, which is shrunk on to the cast-iron body of the large gear wheel, are of special steel. The teeth are cut on a precision milling machine by the involute process. The shafts are of Siemens-Martin steel, and all bearings are lined with white metal.

A small motor-driven pump is used for circulating oil through the clutches for normal running, but for reversal all the oil is transferred from the ahead to astern clutch or *vice versa* by a more powerful centrifugal pump, gear driven by a vertical shaft from the main shaft, a small Föttinger clutch being arranged in the drive so that by filling and emptying this clutch



THE FÖTTINGER MECHANICAL HYDRAULIC CLUTCH

the main pumps are controlled for reversal of the engine. This control is centered in the maneuvering position. The vessel is stopped by emptying the clutches of oil altogether, the main engines, of course, running all the time and in the same direction and having a speed range of from 300 r.p.m. to 90 r.p.m., corresponding to 83 to 25 r.p.m. of the propeller, while a further reduction down to 10 r.p.m. of the propeller can be made by controlling the supply of oil to the clutches. It is interesting to note that after one engine has been stopped for any reason for a period and if the other is running, the stopped unit may be started up again by simply opening up the compression cocks in the cylinder, turning on the fuel, and admitting oil to the clutch. The second engine then sets the first in motion and then, with the compression cocks closed, the engine picks up automatically.

The maneuvering qualities of the ship are good. We were present at a trial trip of the vessel off the Tyne on Wednesday, July 16, during which vigorous maneuvering was carried out, the ship responding remarkably well to orders from bridge. The *Vulcan*, it is interesting to note, since her completion has visited Norway and Sweden. She left the Tyne with a cargo of

coal for Genoa, after which it is proposed that she should return to Germany, calling at Spanish, Portuguese, French and British South Coast ports en route. She is an interesting vessel in many ways and she certainly represents a definite step forward in one particular branch of motorship construction. Whether or no British shipowners have been impressed by this form of propulsion time alone will show, but in the meantime it is certain that German shipowners feel very confident of its potential value because already orders have been placed with the Vulcan-Werke for two vessels of 10,000 tons d.w., each to develop 4,000 b.h.p., these ships being for the Hansa and Hamburg Australian Lines respectively, and also an order for two 12,000-ton d.w. 6,000 b h p. motor tankers for the Deutsche Amerikansche Petroleum Company; and in this latter connection it should be mentioned that the Vulcan Company are confident that the fitting of their system to tankers will do much to eliminate the trouble which has been experienced in the past from vibrations in this type of ship.

First Ship Raised From Scapa Flow

Washington *Star*, 6 September, 1924.—Scapa Flow, September 16.—The first ship of Germany's war-time navy which was sent to the bottom of the sea here by her officers June 21, 1919, has been raised and will be consigned to an equally ignominious end on the scrap-iron heap.

A firm of London engineers has completed the salvage of the vessel—the destroyer *V-70*—after a year's work and many unsuccessful attempts to float her.

The *V-70* was a big ship of the 80 class, which had sunk in twenty fathoms of water in the center of the Flow. The engineers had exhausted the best known methods of ship salvaging before using the system of underslinging heavy cables and raising the ship by means of the floating dock. This latter method was used about six weeks ago, when the vessel was raised eleven feet before the iron chains which were then used broke, thus allowing the prize to settle once again to the bottom. Wire cables were then substituted, which supported the enormous weight long enough to permit the dock to be placed under the ship.

The dock was then towed near the shore where workmen will start cutting through the heavy steel hull and dismantle the fittings. At present the engineers are unable to estimate the ship's value, but after they had pierced the heavy seaweed coating they found the metal to be in a better state than was expected. They claim that the salvage work, though costly, will show a good profit, but it will not make a very large contribution to aiding the reparations payments.

Several of the other ships which were scuttled in the Flow will be raised in a similar manner, but it will take between three and four years to complete the work.

The Salvage of the German Fleet at Scapa Flow

Engineering, 15 August, 1924.—In June, 1919, it will be remembered, the German residual crews on the naval vessels in Scapa Flow opened the sea cocks and caused all the ships to fill with water and sink. If they ever imagined then that the vessels would eventually be raised, there can be no doubt that they never contemplated the possibility of one of their own floating docks being used for the purpose. The enterprise of a very resourceful organization in salvage work and shipbreaking has, however, made this possible, and today what was once a floating dock used for testing submarines by the German naval authorities is in commission raising the various units of the ex-German Fleet. We are enabled, through the courtesy of Messrs. Cox and Danks, Ltd., of 168 Regent St., London, the well-known shipbreakers who have the

work in hand, and who demolished the dreadnaughts *Orion* and *Erin* at their yard at Queenborough, Sheppy, in compliance with the terms of the Washington Treaty, to show how the erstwhile floating dock was converted for use in its new service and to illustrate the first example of the work done with it.

The floating dock in question was referred to in an article entitled "Floating Dock for Testing Submarines" which appeared in our issue of February 25, 1921, when many of its constructional features were illustrated. Further illustrations of the dock were given in our issue of October 5, 1923, accompanying an article on "Shipbreaking at Queenborough." When Messrs. Cox and Danks, Ltd., undertook the work of salvaging the German vessels at Scapa Flow, it was decided to convert the old submarine dock into two pontoons for use in the operations. In its general construction the dock

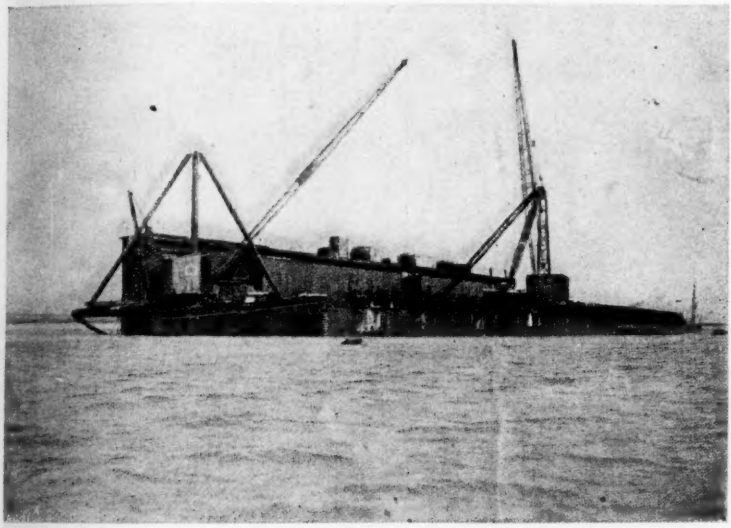


FIG. 1. THE CONVERTED DOCK IN TOW ON ITS WAY TO SCAPA FLOW

was similar to other floating docks but had a cylinder, some 380 feet long, erected along the middle length. This was provided with doors for the admission of submarines, and in it the submarines were tested under external pressure. For the new work it was decided to remove one of the side walls and to remove the long testing cylinder. The demolition continued until all the side had been cut down and the tube had been dismantled and the parts removed. Shafting of six-inch diameter and substantial pulleys for chains or wire ropes were erected along the new face of the pontoon and it was then towed to Scapa Flow.

In Fig. 1 the dock is shown as it appeared when being towed to its new sphere of service. Although it was not intended to use the dock in this state, it was kept whole in order that the expense of towing should be kept down to a minimum. Only when it was transferred to the place of its use was it cut into halves to obtain two pontoons of about 200 feet length and 80 feet breadth. Each of these had ten sets of winches, by the use of which the wire rope of a block and tackle may be taken up in order that the

chains or main ropes placed under a vessel, which is to be raised, may be pulled up.

For lifting purposes both chains and wire ropes were used to pass under the vessel, and received their motion from the winches and tackle on the two pontoons. This first attempt proved unsuccessful as there was a very bad weld in one of the chain links, which were made of three and one-half inch metal. When the vessel was raised a few feet, this link gave way and its collapse was followed by that of links of the other chains. After this experience Messrs. Cox and Danks, Ltd., decided to replace all chains by wire ropes to obtain greater safety in working, and make success certain. These wire hawsers were widened out at the center to obtain a flat belt-like surface at the places where they come into contact with the vessel.

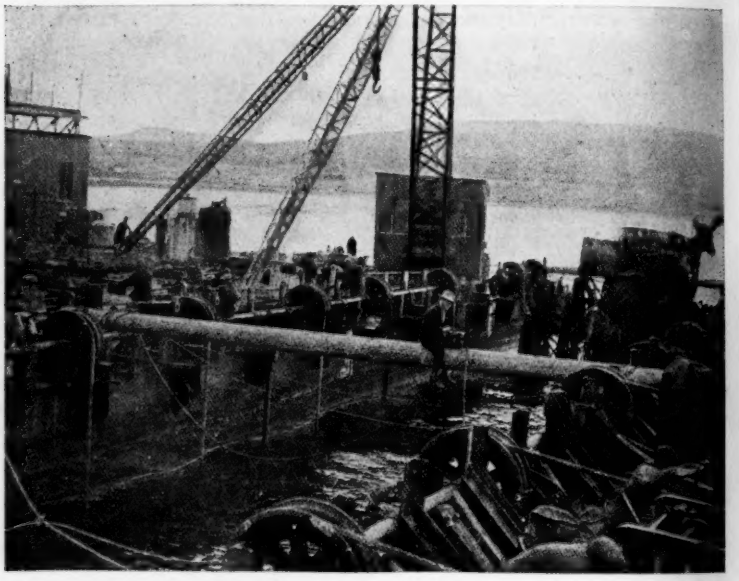


FIG. 2. TORPEDO BOAT DESTROYER "V-70" BEING LIFTED WITH WIRE ROPES

The new arrangement is illustrated in Fig. 2, where the raising of torpedo destroyer *V-70* is shown in progress. It will be noticed that the two pontoons are maintained in association with one another by the use of timbers lashed to each. The winches are of ten-ton capacity, and are treble-geared and operated by hand. The rope from the winch is passed round pulley blocks with five or six sheaves, and, to the block near the pulley on the edge of the pontoon, the main or lifting rope is connected. Wire ropes are used throughout, that passing through the blocks being a four-inch one, while the main one is of nine-inch size. The main pulleys are three feet six inches in diameter and, having been made originally for chains, they have lips at the sides of the rims in addition to grooves made in them where the lower parts of the chain links were previously accommodated. In the actual operation, after the load was lifted a certain amount, it was necessary to take up some of the lifting rope in order that the blocks could be reset at the maximum distance apart for further working. It was found that this

could be successfully and easily accomplished, one rope at a time, until the whole series had been satisfactorily adjusted, when the lifting could be resumed by working all of the winches.

On August 1 the first successful lift was accomplished. The ten main ropes had been previously placed under the torpedo destroyer *V-70* by divers, and at dead low tide, 4:00 A. M., the operations were begun by making all the ropes taut. The rise of the tide was thus used to assist in drawing the vessel out from the position it had taken up five years previously when it was scuttled and sunk. Hauling was started and was accompanied by the continuous rise of the tide. By 11:00 A. M., the pulleys for the main lifting ropes had been given a complete turn, so that the vessel had been raised through a distance of over ten feet relative to the pontoons. The

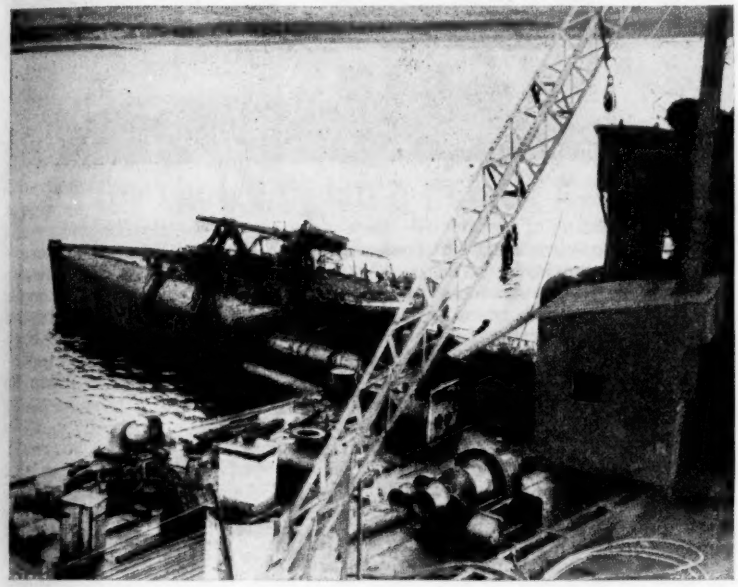


FIG. 3. THE SALVED TORPEDO BOAT DESTROYER

torpedo boat destroyer was then about two feet below the surface of the water. The effect of the suspended load acting at the edges of the pontoons is shown by the slight tilting observable in Fig. 2. While the destroyer was thus suspended the two tugs *Ferrodanks* and *Lyness*, belonging to the firm, towed the pontoons a distance of one and one-half miles and got her into shallow water at Mill Bay on the island of Hoy. Photographs of the vessel were taken by *The Times*, and it is through an arrangment they made with Messrs. Cox and Danks, Ltd., that we are enabled to reproduce Figs. 3 and 4. When the destroyer was deposited its deck was awash, but Fig. 4 shows its appearance when the tide is down. From this location the vessel will be taken to the Admiralty Pier for breaking up. After five years' immersion the craft is naturally covered with barnacles, moss and seaweed. In this undignified state the vessels of the German Navy are being recovered merely for the sake of the metal they contain.

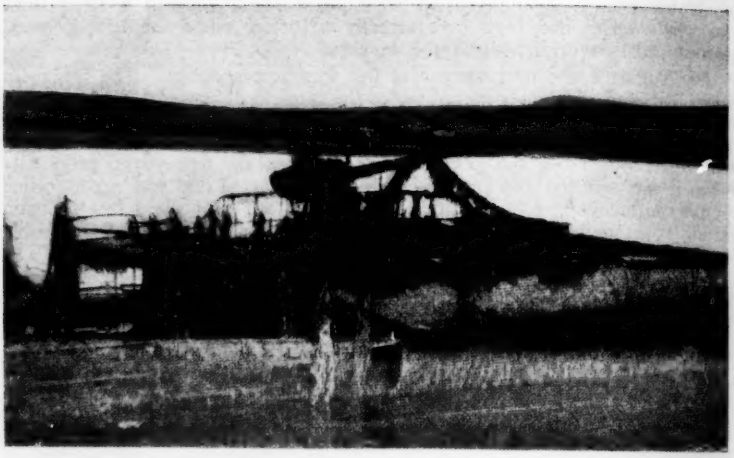


FIG. 4. SALVED VESSEL AT LOW TIDE IN MILL BAY

As a salvage operation, the speed with which the work was accomplished is worthy of emphasis. The use of the pontoons made the work comparatively light, and it cannot be denied that it forms a splendid example of how resources may be turned to the successful and easy accomplishment of what might otherwise have been a formidable task. The torpedo boat *S-53* was also successfully raised and is now at Mill Bay. Further operations will follow, and we trust that these early successes are an index to the results that are to be attained in the complete endeavor.

AERONAUTICS

Airplane Surveying

The Engineering Journal, September, 1924.—Professor H. L. Cooke, M.A., Professor of Physics, Princeton University, read before the Ottawa Branch, The Engineering Institute of Canada, March 24, 1924.—Although the problem of preparing maps from photographs taken from the air has been the subject of investigation for over fifty years, the present widespread interest in this subject only began to be evident after the beginning of the recent war. The extraordinary development in airplane design and the technique of air photography which was accomplished very early in the war resulted in the production of air photographs of very high technical perfection. A very cursory examination of these photographs reveals the vast amount of detailed information which can be obtained by means of them and as the photographs appear to have the same general characteristics as drawn maps and in many cases were very close approximations to maps, the conclusion was jumped at that the preparation of accurate maps from these photographs was a simple matter, but a detailed examination of the nature of the problem of preparing contoured maps by means of these photographs reveals at once the extreme complexity of the matter.

Photographs taken from the air may be broadly classed in two groups: vertical and oblique views. A vertical photograph has the advantage of being an approximation to a map without contours. The relative positions of all objects shown in the same photograph are approximately true and ap-

proximately to scale, but as soon as one attempts to make accurate measurements on such a photograph the errors in scale and exact position become apparent and it is seen that although the photograph is approximately a plan of the country, it lacks precision. The approximate accuracy of these vertical views is utilized in so-called mosaics, in which vertical views covering an area are fitted together and form a reasonably good plan of the country covered. These mosaics show an extraordinary wealth of detail but their inaccuracies are always present to an appreciable degree. Tracings made from these mosaics cannot be regarded as maps in the scientific sense of the word.

The other class of airplane photographs, the oblique views, give one a much more realistic impression of the country and indicate in a more or less satisfactory way the nature of the undulations of the ground, but due to the variations in scale in the foreground and distance they are almost useless for an accurate estimation of relative distance and directions. It is the so-called distortion, due to the tilt of the camera, which is evidenced in the form of varying scale.

This brings us to a much discussed feature of our problem: that of distortion. The different types of distortion encountered in airplane photographs may be classed under several headings: First, there is the lens distortion, due to the fact that no lenses are perfect, and in general this distortion takes such a form that a perfect square when photographed will appear to have either convex or concave sides, these two effects being known respectively as barrel and cushion distortion. In a high grade lens this effect is small and will not be discussed in detail in this paper. Other distortions of negligible magnitude are those due to refraction of the atmosphere and curvature of the earth, but when these effects are disregarded, we are left with two types of distortion of considerable magnitude which are of prime importance in the problem of airplane mapping.

The first of these is the distortion which is the characteristic feature of the oblique photograph. This distortion would appear by taking an oblique photograph of a rectangular grid on the ground, in which case the photograph of the grid would in general show two perspective vanishing points. This type of distortion will be referred to as the distortion of perspective and it has to be eliminated in some way before the photographs can be employed directly for mapping. The photograph must be put through a process of horizontalizing or rectifying by means of which it is changed into the photograph which would have been taken if the axis of the camera had been exactly vertical and the plate exactly horizontal at the instant of exposure. A photograph taken under these conditions or rectified so as to conform to them is entirely free from the distortion of perspective.

The last type of distortion to be discussed constitutes the most important and useful feature of photographs from the air. This distortion will be referred to as the radial distortion. The nature of this effect may be understood if one imagines a photograph of a high tower taken from the air in an oblique manner. The top of the tower will occupy the same position on the photograph as an object on the ground lying beyond the tower in a direction radial from the plumb line through the camera position. This effect will at once be seen to depend, among other things, on the height of the tower, and it is, in fact, the means of determining heights and contours by means of airplane surveying.

This effect is present to a very slight degree in vertical small angle photographs, which are therefore not of great value for accurate contour surveying. On the other hand, radial distortion is present in pronounced form in oblique photographs, but the difficulty in horizontalizing oblique views is much greater than in the case of nearly vertical views. Vertical wide angle photographs combine advantages of both types and for this

reason I have devoted a great deal of time to the production of a camera adapted to secure vertical views of the kind, and at the present time I think I am justified in saying that the main difficulties of this problem have been solved.

A detailed examination of the difficulties encountered in the mapping problem will show that they are nearly all either eliminated or simplified by the use of this type of photograph, which appears to be quite free from any characteristic disadvantages. For instance, it may be shown that if a given area, say ten square miles, is to be covered by a single photograph, the most advantageous position for the camera is over the center of the ground photographed with the camera axis vertical, and from as low a height as will just prevent the serious obstruction of the view of distant objects by higher objects lying nearer to the camera position.

We now come to a consideration of the main problem, which is the production of the contoured map from the photographs. To understand this problem we will have to realize at the outset that the geometrical principles on which any scientific method is to be based are in essence identical with those of the method of topographical surveying from the ground, methods which have been understood for thousands of years.

In work from the ground it is necessary for the observer in the field to locate his position by direct or indirect reference to known central points whose positions have been determined. To locate objects in the field the surveyor must determine the bearing or direction of the object as viewed from two located points. The intersection of these bearings determines the position of the object and angles of elevation or depression determine the heights. The fundamental problem of the field surveyor is the determination of the position from which his angles are read. Similarly, the determination of the airplane position is the fundamental problem of the airplane surveyor.

Although the problems confronting the two types of surveyor are the same as regards their general object, the solution of this resection problem as it is called, is child's play for the ground surveyor as compared with the difficulty which confronts the airplane surveyor. The reason for this is that the ground surveyor has a fixed platform to work from and his instruments are fitted with levels which enable all his angles to be read under ideally simple conditions as regards subsequent reduction by the computer. Once the instruments are leveled it makes very slight difference whether the observations are taken photographically or by sighting in a telescope. In the airplane, however, the conditions are entirely different.

Attempts have been made to devise instruments which will indicate a true vertical when used on aircraft in flight, and for the purpose of preparing mosaics, instruments of this type have already been produced which are reasonably satisfactory in their performance; but for the purpose of contour surveying, the determination of the vertical must be effected with scientific precision if the contours of the map are to be exact.

The requirements for the determination of the height of the airplane also call for a precision considerable in excess of anything so far attained by the use of altimeters. It appears, therefore, that at the present time it will not be possible to determine the airplane position corresponding to a photograph directly by means of instruments carried in the machine. We are, in effect, thrown back on the same geometrical principles for our position determination as those employed by the ground surveyor. The resection problem on the ground, in two dimensions, becomes in effect the resection problem in space, and its difficulties are multiplied enormously when it becomes a three dimensional problem.

Let us now consider the problem in detail. Just as the ground surveyor requires observation on three control points to determine his position,

so the airplane surveyor requires that three known objects shall appear on each photograph. The angular separation of three control points as viewed from the airplane enables the position of the point of sight to be determined, but not without ambiguity. Time prevents a detailed discussion of this ambiguity, but it may be stated that if certain simple precautions are observed this ambiguity disappears and the position is definitely determined by means of the angular separations of the three points photographed on the plate. These angular separations are determined by means of the photograph if the relative position of the lens and plate is known, so that without further discussion we may say that by direct or indirect methods these angles are known from an examination of the plate.

Let us, then, imagine that the plate, after development, is set up in the same relation to the lens and that the images of the three control points are projected as rays passing out from the lens into space and forming the edges of a tetrahedron or pyramid. If, now, we imagine that we are able to construct out of, say a piece of cardboard, a triangle corresponding exactly to the triangle formed in nature by the three control points appearing on the photograph taken in their own plane, (which is not necessarily horizontal, same height), we can imagine that we are able to move this cardboard triangle around in the path of the three rays until we find a position in which the rays exactly coincide with the corresponding corners of the triangle. If this operation is carried out we have reconstructed the geometry of the airplane position and the three control points in nature, and the subsequent calculation of the airplane position based on this reconstruction of the pyramid is a perfectly straightforward problem of computation or mechanical solution and the horizontalization of the photograph is a simple matter.

The solution of the pyramid reconstruction is beset with difficulties on every hand. The problem has been solved by direct mathematical methods but the labor involved is enormous and on this account it does not appear at present that this is the practical solution of which we are in search. An idea of the complexity of direct mathematical methods may be gathered from the fact that if simultaneous equations for the airplane position are set up, based on the angular separations of the control points, these equations have sixty-four roots, one of which is the position of which we are in search. This direct mathematical method is the work of two German scientists, Hugershoff and Cranz.

There is a second method also due to a German, which consists in a mechanical reconstruction of the pyramid. In this method an adjustable metal tripod is used which is fitted with telescopic legs and angular adjustments and scales at the apex. These angles are adjusted to correspond with the angular separations of the control points as determined by means of the photographs, and a three dimensional reproduction of the three control points is set up by means of adjustable pillars resting on a horizontal surface. The tripod is then moved around until its three feet simultaneously rest on the corresponding three points of the reconstructed triangle, the telescopic legs enabling this adjustment to be carried out without alteration of the apex angles of the tripod. When this adjustment has been effected, a plumb line suspended from the tripod apex indicates the projection of the airplane position on the horizontal surface and the height of the apex above this surface corresponds with the height of the airplane. This method, due to Dr. Max Gasser, is much more rapid than the method of Hugershoff and Cranz, but it appears to be open to the serious objection that the tripod cannot be constructed of sufficient rigidity and accuracy to compete in its performance with the accuracy of the field theodolite or the mathematical accuracy of the Hugershoff and Cranz method.

The third and last method which I shall describe, is one on which I

have been working for a number of years. It consists in essence of mounting the developed photographic plate and projection lens in a camera so that the relation between the plate and lens is similar to that which existed at the time the photograph was exposed and projecting the images of the control points so as to secure coincidence with three points plotted on a screen so as to correspond to scale with the control triangle in nature considered in its own plane. When this adjustment is effected the relative position of projection lens and the three points on the screen corresponds with the pyramid in nature resting on the three control positions with the airplane position as apex. This seems at first the obvious and straightforward method of solution, but its practice is beset with many serious difficulties.

If vertical views of the ordinary sort are employed it is found that the fixing of the airplane position cannot be attained with the required accuracy as considerable changes in adjustment do not appreciably affect the coincidence of projective images and plotted points. If oblique views are employed it is necessary, in order to secure sharp focus in the plane of the screen, to decenter the projection lens by swinging it on its center. This introduces errors and mechanical difficulties of a serious nature which very much reduce the accuracy and usefulness of the method.

It thus appears that if this projection method is to be employed, the airplane surveyor is on the horns of a dilemma, since the vertical and oblique views each have characteristic disadvantages. The employment of wide angle approximately vertical views eliminates these disadvantages and enables the airplane position to be determined with a very high degree of accuracy.

The projection apparatus is based on certain geometrical principles which enable the coincidence of the projected triangle to be effected with great speed and accuracy and the three scales incorporated in the instrument enable the polar coordinates of the airplane position to be read off directly with the precision of a theodolite. The arrangement of the instrument is also such that a single angular adjustment made after the above coincidence has been effected enables the operator to secure an accurately horizontalized projection of the photograph of which all the constants are determined by scale readings of the apparatus. It appears that this method represents the shortest means to obtain the horizontalized positive to be used for the mapping itself.

In both the other methods referred to, the production of the rectified positive after the airplane position has been determined is a much longer and more tedious matter. However, this step in the different processes will not be gone into in detail and we will assume at once that we may obtain these rectified projections by any of the three methods described and go on to a consideration of the method of employing these rectified projections in the production of contoured maps.

In order to secure contoured maps from the rectified projections it is necessary to employ these projections in pairs and by a method corresponding to the method of cross bearings and elevations employed in ground surveying to determine the position and height of unknown objects. This involves projecting the horizontalized views on the mapping surface in a certain definite relation to each other corresponding to the relative positions of the projections on a horizontal plane in nature of the objects as viewed from the two airplane positions.

When this relative position of the projections has been secured the position and height of unknown objects may be determined by means of the method of cross bearings and radial displacement of the images. Although this method may be employed directly it is an enormous advantage to arrange the projections so that they may be viewed by a direct stereoscopic method or an anaglyphic method, (two color stereoscopic method), or an equivalent of one of these methods.

By a process of this type the draftsman may be made to see the terrain standing out in bold relief and to draw contour lines directly by running his pen through all objects which appear to be in the same plane as the mapping surface. Different contours may be drawn by shifting the mapping surface backwards and forwards from the lenses which are projecting the images on the mapping surface, these lenses being placed to correspond with the airplane positions of the two photographs. These stereoscopic methods are capable of a great variety of modifications.

A word may now be said about the cameras with which I have been experimenting. In order to secure a satisfactorily exposed wide angle view, it is necessary to employ a slow lens and a much longer duration of exposure than with the fast lenses heretofore used in airplane photography in which the exposures are usually about 1/200 of a second. If a wide angle lens is to be employed it is practically necessary to take a time exposure from the moving aircraft. The point of sight of the exposure is changing during the exposure, as evidenced by a drift of the photographic image across the plate, and the camera, with the ordinary type of mounting, is vibrating to such an extent that a time exposure is out of the question.

Two types of cameras have been experimented with in which the vibration is eliminated by a suitable stabilizing device in which the drift of the photographic image across the plate is compensated for by an adjustable slow motion. With the first type of camera an exposure of one-third second was employed with resulting good definition over an area of about seven and a half square miles in vertical photograph, taken from a height of ten thousand feet. In the second type of camera, which is still being experimented with, an exposure of one second was employed. This camera is designed to take in a very much wider angle of view than the first type. The photographs with the first type of camera are being employed for the production of a contoured map of an area about twelve square miles lying about ten miles to the northwest of Ottawa, Ontario, this area being selected as exhibiting unusual difficulties from the point of view of airplane survey, a large part of the ground being extremely hilly and covered with uniform woods. The flying and field work was done with the very kind cooperation of the Canadian Air Board and Survey Department. The constructional and mapping work are being done at the Palmer Physical Laboratory of Princeton University.

With regard to the ultimate limitations of airplane surveying it may safely be said that the time will never come in which all the work will be done from the air. The three methods of airplane surveying which have been outlined each look forward to the possibility of enabling aerial traverses to be run between control points many miles apart, so that ultimately we may hope that the necessary ground control will be reduced to geodetic points twenty or thirty miles apart, fixed with the highest accuracy.

The precision of these aerial traverses will depend very largely on the number of over-lapping photographs required to bridge the gap between adjacent geodetic controls. If vertical views of extreme wide angle can be obtained, this problem of working directly on the geodetic control will have been practically solved. It is very largely on this account that I attach so much importance to the wide angle vertical view, but even supposing that these extreme angle photographs are obtainable, we are still left with much work to do on the ground. Names or rivers, towns, etc.; conditions of roads, courses of roads covered by overhanging forests; nature of important land marks and structures, will all have to be ascertained by direct examination on the ground.

The method will probably be for trained men to travel around in small cars with enlarged photographs of airplane views covering the terrain on which they are working. Details and information about the terrain will be sketched in and noted on these enlarged photographs to be forwarded

to the drafting room where the maps are being drawn, but the work of field surveying as we now understand it with the plane-table and small theodolite, will be practically eliminated for the purposes of mapping. The field surveyor will be employed more and more in the accurate surveying of properties. On the other hand, I can see the work of establishing geodetic controls for the airplane surveying being pushed to the limit in the way of speed in order to keep up with the speed of the pursuing airplane.

Before closing this paper something may be said about the general situation with regard to airplane surveying. A rapid and accurate method of producing contoured maps from airplane photographs is urgently required in practically all the civilized countries of the world. In the United States, for instance, there are still about two million square miles which have not been covered by contour maps. At the present rate of progress it will require more than forty years to complete this work. Demands are received in Washington almost every day for maps of almost any kind, of regions in which industrial development is proceeding rapidly. The situation in other countries is very similar. It is this situation which makes all those conversant with the facts so interested in this problem, which is one of utmost importance to the progress of rapidly developing countries.

I have tried in this paper to give you some idea of the problem from a scientific viewpoint and have tried to treat it in as broad a way as possible. We may say that the problem of airplane surveying has been solved. The development of methods to a state of very high efficiency may be looked forward to with absolute certainty and in view of the vast interests involved it will undoubtedly be carried out with great rapidity and energy. It is certain that within a quarter of a century this country will be completely mapped and that the contouring of these maps will be far more accurate and reliable than that produced by present means, since stereoscopic methods enable direct observation to be made on each point of a contour line and not merely at considerable intervals, as is done by present methods.

First Helicopter to Fly a Circular Kilometer

Aviation, 18 August, 1924.—We are indebted to *L'Aeronautique* for the following account by Etienne Oehmichen, pilot and inventor of the Oehmichen helicopter which was accepted by the French Government after having completed a circular kilometer. The machine was described in detail in our issue of April 9, 1923.—Editor.

The apparatus which has permitted me to make the first circular kilometer in a helicopter is the one with which I made the first fixed point flight of five minutes in May, 1923, and which has since been the subject of several modifications to adapt it to forward flight and to improve its stability in a wind.

It consists of four principal propellers, a system of five "controllers" or stabilizers which are propellers of variable and reversible pitch whose diameters are, respectively, 1 m. 45 for the three longitudinal controls, and 1 m. 55 for the two transverse controls. Two propulsion propellers with fixed pitch and a diameter of 1 m. 40 are driven by belts. These are placed on either side of the central cage and are about half way out on the frames which support the lifting screws. They are, however, considerably below the lifting screws.

To the landing system has been added a double skid placed in front for the purpose of reducing the shocks of landing on the front part of the machine, as such shocks are increased by the full weight of the helicopter.

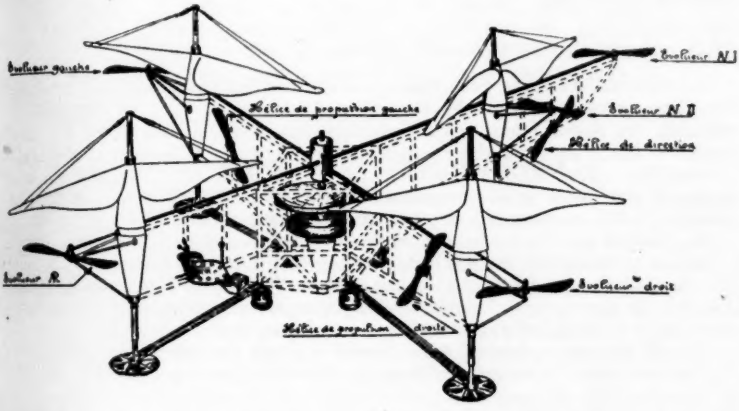
The apparatus weighs approximately 1100 kg. in running order. The main propellers turn at 145 r.p.m. and the load is approximately 33 kg. to the square meter.

I consider this apparatus simply as an experimental job, built to lend itself easily to alterations, especially insofar as the stabilizing and propulsion apparatus is concerned. It is more a flying laboratory than a practical aviation apparatus.

I have gathered, during the course of my methodic experimenting and nearly 450 flights, a series of invaluable data, especially with reference to cross winds, the influence of the ground and that of forward motion.

The apparatus is actually very maneuverable. Turns are easily accomplished, but there is noticed sometimes, especially during the course of flights in bumpy weather, a certain sluggishness in turning, which indicates the necessity for even more powerful controls. This only applies for changes of direction of from 90 to 180 degrees; the turns of 45 degrees are accomplished on the slightest movement of the controls.

I have, therefore, particularly studied the question of turns and since the month of October, I have made about forty circular flights of an average



DETAILS OF OEHMICHEN HELICOPTER WHICH HAS BEEN ACCEPTED BY THE FRENCH AIR SERVICE

length of from 600 to 700 m. The precision of the landings has always been considerable.

During the course of the trial, the principal and practically the only difficulties came from the motor, whose excessive vibration produced accidents of all kinds. Besides, sudden stoppages due to bad cooling, forced me often during the course of a flight to suddenly lose height and to touch the ground with one or more of the landing skids, which disqualified me from counting the circuits made as a continuous flight.

I was able during the course of the winter to make several important circuits, one of 1850 m. touching only once with the rear skid, but I had never succeeded in making the circular kilometer without stopping or touching.

On May 4, at 7:30 P. M., in the presence of Mr. Chollat, official delegate of the *Service Technique de L'Aeronautique,* I made a trial flight in a closed circuit. Though the atmosphere was calm a few gusts still lingered and gave a little motion. In spite of all this I brought the apparatus back to the starting point of the prepared circuit, which was a triangular course of 1 km. marked out by stakes. The apparatus, oscillating between one and three meters, flew the first two sides of the triangle correctly but the third corner

stake was widely passed by, as at that time the machine showed a certain sluggishness in turning. This brought me over a strip of deep ditches and small gullies, seeing which I gained altitude which allowed me to make my corner rapidly and get on the course again.

The last leg of the triangle was flown very rapidly at an elevation of one or two meters and with a slight turning to the left. The landing point, which was rather hard to see through the maze of tubes and wires, was pointed out to me by the men of my crew, one of whom, running along in front of the machine, showed me with outstretched arm the proper course. I soon passed him and a few seconds after I set the apparatus down a little less than 2 m. from the point of departure.

This termination has now terminated its career and fulfilled exactly the conditions imposed by the *Service Technique de L'Aeronautique*, to whom it is destined. I expect to use it to get a few figures which I still lack.

The apparatus which will follow will attack the problem of security, that is, a descent with the motor stopped, and will have the benefit of the previous experience.

Helicopter Lifts 220 Pounds Easily, Winning Big Prize

Washington *Star*, 15 September, 1924.—Montbeliard, France, September 15.—The success achieved by Etienne Oehmichen, the French engineer, in winning the 40,000-franc prize yesterday for weight-lifting with his helicopter is but a phase in the experiments he has been making with this type of machine. The helicopter used in the official test lifted 220 pounds to a height of one meter in one minute and remained in that position for another minute. Later it exceeded this height with a still greater weight.

M. Oehmichen had already made vertical and circular flights and it remained to show that the machine was capable of carrying a cargo. During the three flights made in the official test the stability of the machine was found to be perfect and the opinion was expressed that what was shown to be possible at a height of three feet was equally so at thirty feet or more.

The flights were checked by a specialist from the Air Department, who had no hesitation in awarding the prize offered by the department.

New Dirigibles Give Helium Value

Washington *Star*, 28 August, 1924.—The coming of the German-made dirigible *ZR-3* to the United States this fall accentuates the value of that recent acquisition to science, non-explosive helium gas, of which this country possesses a commercial monopoly. The *ZR-3*, which is to become American property as a reparations payment, will be flown to America, using hydrogen, but upon its arrival it will be inflated with helium.

So important is deemed the American supply of helium that a measure is pending in Congress to insure its conservation and to prohibit its exportation.

The Bureau of Mines, to which branch of the Department of the Interior was intrusted the search for helium and the working out of processes for its recovery, has just installed a new extraction plant at Fort Worth, Tex. There, in conjunction with the commercial development of the product, the Government will carry forward the new method, which is to be turned over to the Navy to operate later when demonstrated fully successful.

A repurification plant has recently been installed at Lakehurst, N. J., home of the Navy air giant, *Shenandoah*. Air seeps in through the huge envelope of the *Shenandoah*, and when the helium purity is lowered to eighty-five per cent, through admixture of the air, the mixture is taken out and put into a refrigeration plant and again separated. Helium ninety-eight per cent pure is recovered, with only about one per cent loss.

The new repurification plant cost about $100,000, but it has already demonstrated a saving of $180,000, each time the gas is taken out and repurified. The cost of filling the *Shenandoah* with unused helium is estimated at $200,000. The repurification system enables helium formerly used to be restored to its pristine purity and pumped into the *Shenandoah* for $20,000.

Sources of supply of helium are in Texas, Oklahoma and Kansas, three states in which it was originally found, and more recently in Utah and Montana, according to Dr. C. S. Lind of the Bureau of Mines. The conditions which regulate its retention are not known. Unless helium is found to exist in quantities of one half of one per cent, mixed with other gases, commercial development is not considered worth while. Two per cent of helium in a well is the maximum.

Helium is "perfectly inert chemically," says Dr. Lind. "It won't burn or explode, and it might even put out a gasoline fire. While hydrogen can be manufactured anywhere in the world and is universally obtainable, the safety of helium makes it the more desirable."

Helium was first discovered in the sun in 1869, Dr. Lind explains. From the Greek word helios, meaning the sun, it gets its name. It was discovered on earth in 1895 and in the United States in natural gases in 1907. The Bureau of Mines started helium work in 1917 as a war proposition.

ORDNANCE

American Battleships and the Washington Treaty

Engineering, 5 September, 1924.—During the past week the President of the United States has announced that his Government could make certain alterations to the main armament of the battleships of the American fleet without violating the Washington Treaty. Indeed, if the press conveyed his utterance correctly, one can assume that the President went further, and hinted that the treaty actually gave his Government a right to alter the battleships. A later report, however, hints that the President may assert this right but not exercise it for the time being. These statements should not be discussed independently of their antecedents.

Rather more than a year ago, Mr. Denby, who was then Secretary to the Navy in the American Cabinet, urged Congress to vote money for increasing the gun range in thirteen American battleships. His argument was simple. British battleships could use their main armament against an opponent at a range of 23,000 yards: the greatest range of the American battleship armament was 20,000 yards. There could be no question of equality between two forces so differently equipped, as the one had an overwhelming tactical advantage over the other.

The subsequent history of this recommendation is not very clear; the Naval Committee of the House of Representatives certainly reported on it favorably, and said that, in their opinion, the alterations could be made without any violation of the Washington Treaty. This alone would not have sufficed to persuade the American people to vote the money; but, almost simultaneously, Admiral Coontz reported on the state of the Navy as revealed at the spring maneuvers off the Panama Canal. He drew attention to many faults and failings in the equipment of the fleet, and his report raised a great deal of very anxious comment in the press. The plea for increasing the range of the battleships' guns was for the moment lost in the bigger contention, that the naval ratios established by the Washington Treaty had been upset by the failure of the American Fleet to maintain itself on a standard of equipment equal to that of its principal rival, Great Britain. This general clamor did, however, have a great effect upon Congress. The money for altering the battleships' guns was voted, and it was only by a hazard of American parliamentary procedure that the matter was

held over for final settlement until next session. Meanwhile, the British Government is reported to have notified America that, in their opinion, the alterations cannot be made without illegality. What process of reasoning has led the legal and naval advisers of the two countries to these opposite conclusions?

In the American view, there is only one clause in the treaty which could possibly be said to forbid the proposed alterations. It runs thus: "no alterations in side armor, in caliber, number or general type of mounting of main armament shall be permitted, . . . "; after which there are certain specified exceptions, which the Americans consider are not to the point. They, therefore, claim that the proposed alterations can be made without changing the "general type of mounting" of the main armament, and support their argument as follows: Five things are necessary to increase the range of the guns: (1) The gun port openings must be made larger; (2) the elevating screws must be lengthened so as to allow the breaches of the guns to be lowered further; (3) some of the plates and framing under the guns must be cut away so as to allow the breaches to be lowered as far as the lengthened elevating screws permit; (4) the position of the ammunition hoists must be altered; (5) the recoil system of the guns must be made more powerful. These alterations, say the Americans, are readjustments of parts of the existing mountings and no more. A gun mounting belongs to a "general type" by virtue of its design and the mechanical system under which it operates. A six-coupled locomotive belongs to a certain type of machine because it has six driving wheels, and not because they are of this or that diameter.

The American contention is plausible but extremely disputable, and British objections to it are threefold. First, a gun mounting, in combination with an explosive charge, is designed to give a gun a certain specified range. If it is so altered as to give the gun which is mounted on it qualities that it did not possess before, then, most certainly, the type of mounting has been changed. It is no answer to say that the alterations, taken one by one, leave the gun on the same type of mounting: they must be judged by their total effects and consequences. Nor is this all: the clause in the Washington Treaty which prohibits alterations to the mountings, goes on to say that France and Italy may increase the armor protection and caliber of the guns of their battleships; and that Great Britain may complete certain alterations in the *Renown's* armor. If these exceptions to the general rule are given in such detail, is it conceivable that alterations of which no mention is made can be allowable?

In the second place, it can be maintained that the clause quoted is not, by any means, the only one which forbids the proposed alterations. The Americans argue that they are necessary to maintain the equal ratio between the naval forces of the two countries. In the British view the equal ratio was established by the lists of ships inserted in the first part of the second chapter to the treaty, in which each ship to be retained by the signatories was mentioned by name. These ships were taken to represent a certain combatant power, which, if altered, will not establish the equal ration between the two navies, but upset it.

The third objection to the American argument is not quite so direct but equally strong. It is quite obvious that American naval experts conceived these alterations to be necessary after the treaty was signed. When the need for them was discovered, it was doubtless thought that the American Fleet did not give the country the degree of security which was required of it. This, at all events, seems a fair interpretation of Mr. Denby's original plea; and it can certainly be said that the treaty made proper provision for questions of the kind. Article XXI of the third chapter runs thus: "If during the term of the present treaty the requirements of the national security

of any contracting power in respect of naval defense are, in the opinion of that contracting power, materially affected by any change of circumstance, the contracting powers will, at the request of such power, meet in conference with a view to the consideration of the provisions of the treaty and its amendment by mutual agreement. In view of possible technical and scientific developments, the United States, after conference with the other contracting powers, shall arrange for a conference of all the contracting powers, which shall convene as soon as possible, after the expiration of eight years from the coming into force of the present treaty, to consider what changes, if any, in the treaty may be necessary to meet such developments."

This clause does not deal with gun mountings or armor, but it certainly deals with the American procedure. If the alterations to the battleships' guns involve a question of American naval defense—and it can certainly be claimed that they do—then, the American Government has no right to carry them out without previous consultation with the co-signatories. If, on the other hand, they may be regarded as necessary in view of "technical and scientific developments," then the American Government has no right to give effect to them before eight years are out and another conference has been summoned. To sum up, therefore, one may say that the proposed alterations are intrinsically illegal, and that, if they were not, the proposed method of executing them would be.

Inferiority of the American Navy

Washington *Post,* 1 September, 1924.—When the Washington Conference was held it would have been impossible to reach an accord on limitation of naval armaments if the American people had understood that the United States Battle Fleet would be placed in permanent inferiority to the fleets of Great Britain and Japan.

The essence of the agreement reached, which is now binding upon the three countries mentioned, is that the British and United States Battle Fleets shall be equal, and that each shall be superior to the Japanese Fleet in the proportion of 5 to 3.

The "equality" of the fleets was not to be in numbers of ships but in fighting efficiency, taking into consideration such factors as numbers, tonnage, speed, radius, gun power and gun range. Proof of this intention as to the meaning of "equality" is found in the fact that the treaty allowed one nation to have more ships than another, but offset this factor by calculating other advantages in speed, gun power, etc. The provision which regulates changes in armor and mounting of ordnance and which prohibits increase of size of guns is also proof that "equality" was meant to include all factors which contribute to fighting efficiency.

It is now well known that the United States Battle Fleet is inferior to the British Feet in fighting efficiency as well as numbers. Secretary Wilbur has officially admitted this fact, although he does not admit that the American Battle Fleet is inferior to the Japanese. He makes the curious statement that the United States is above its ratio strength in the Pacific and below it in the Atlantic, apparently disregarding the ability of the fleets to move from one ocean to the other.

One of the most competent of naval writers is Hector C. Bywater, a British authority, whose impartiality and truthfulness have been well demonstrated. Recently, in an article in the Baltimore *Sun,* Mr. Bywater commented as follows upon the inferiority of the American Fleet:

"The debate on the turret-gun elevation and the substitution of oil for coal in certain American ships is now nearly two years old. The American case, which has been ably argued in the service journals on your side, is that the 5-5 ratio of strength between the United States and British Battle Fleets is illusory, and will remain so until absolute equality is attained, not

merely in regard to total tonnage but in gun range and steaming endurance as well.

"That is a perfectly reasonable position to take up. In long-range firing—that is to say, at any range above 22,000 yards—the American Fleet is demonstrably inferior, since thirteen of its eighteen battleships cannot throw their shot beyond that distance, while according to published figures all units of the British Battle Fleet can fire up to 23,800 yards.

"If the two fleets were ever to meet in combat—a contingency which few Britons regard as probable—this American deficiency in length of reach might in certain circumstances prove fatal."

Mr. Bywater suggests that the British and United States Governments should confer upon the subject of ship alterations for the purpose of removing any misunderstanding as to the right of the United States to elevate big guns and substitute oil for coal as fuel.

American naval authorities, with almost no exception, hold that the United States is entitled by treaty to elevate its big guns and to provide oil-burning equipment for battleships. They also agree that the American Battleship Fleet is inferior to the British Fleet. Some of them maintain that the Japanese Fleet is superior to the American, taking into consideration speed and gun range.

If the treaty under which the nations voluntarily refrain from building battleships is to remain effective, the "equality" agreed upon in the formula 5-5-3 must be maintained. Any considerable change in the ratio, whether by lapse of time, neglect, overreaching or other cause, makes the treaty objectionable and provocative of misunderstanding and bad feeling. It is better to have no treaty than to permit the violation of such a compact, which goes to the heart of the nations' power of self-preservation.

At this time, when the great naval powers are the best of friends, anxious to contribute to permanent peace, the United States should take steps to restore its naval strength to the point contemplated in the treaty. No valid objection can be raised by the other contracting parties, and of course they will not raise objections that are not valid.

The restoration of American naval strength to the ratio level can be accomplished at small expense, without entailing new construction. The big guns on certain ships should be elevated to give them longer range, and the coal-burning battleships should be converted into oil burners. The total cost of these alterations would be about $150,000,000. The United States Fleet after these changes had been made would be substantially as efficient as the British Fleet, which contains more ships, and superior to the Japanese Fleet, which now contains battleships of far greater speed and gun range than any American ships.

The germs of fierce controversy lurk in the present situation. It is best that they should be eradicated by a friendly conference of the powers signatory to the Washington Treaty. If war clouds should blow up, with the American Fleet below the efficiency to which the treaty entitles it, a burst of national fury might occur, inflicting great damage to the administration held to be responsible, and making it difficult or impossible to maintain peace.

Discussion of Naval Modernization Plans

Baltimore *Sun*, 26 August, 1924.—By Hector C. Bywater.—London, August 9.—No apology is needed for devoting this article to the American naval modernization program. It is true that the subject has been dealt with in more than one previous dispatch, but developments have since occurred to invest it with a new importance.

The debate on turret-gun elevation and the substitution of oil for coal in certain American ships is now nearly two years old. The American case,

which has been ably argued in the service journals on your side, is that the 5-5 ratio of strength between the United States and British Battle Fleets is illusory and will remain so until absolute equality is attained, not merely in regard to total tonnage, but in gun range and steaming endurance as well.

That is a perfectly reasonable position to take up. In long-range firing—that is to say, at any range above 22,000 yards—the American Fleet is demonstrably inferior, since thirteen of its eighteen battleships cannot throw their shot beyond that distance; while according to published figures all units of the British Battle Fleet can fire up to 23,800 yards.

If the two fleets were ever to meet in combat—a contingency which few Britons regard as probable—this American deficiency in length of reach might prove fatal. True, the late war furnished no instance of ship hitting ship at more than 20,000 yards, in fact, it is doubtful whether a hit was ever made when the moving target was more than 18,000 yards away.

We are told by American writers, however, that the mechanical aids to long-range shooting have so much improved since then that the heaviest guns, manned by highly trained crews, would now have a good chance of scoring hits at anything up to 25,000 yards. Whether or not that is so is known only to naval officials, who are careful to keep the knowledge to themselves.

A great deal would depend, of course, on the weather conditions prevailing when battle was joined. At Jutland and at every other North Sea engagement visibility seems to have been restricted to about fourteen miles, and often it decreased to half that distance. In other latitudes a wider range of vision might normally be expected. For example, the average of visibility is higher in the Pacific than in the Atlantic, and it is well known that the best gunnery scores registered in prewar days were made by ships serving on Pacific stations.

Even at moderate ranges the target is usually invisible to the man actually working the gun. He adjusts his sights and points the gun according to instructions from the observing officer stationed in the foretop, high above deck level. Now that aircraft are employed for spotting work, the range of indirect vision has increased enormously and, granting faultless teamwork between battery and spotting plane, it should be possible to score hits at the extreme range of which the gun is capable.

Whether this will ever become practicable is another matter. Accurate shooting at maximum range is dependent on so many elements—too technical to be detailed here—that hits will always be more or less in the nature of "flukes." Still, the havoc caused by big projectiles dropping almost vertically on the thinly armored deck of a battleship would be so great that an admiral might choose to open fire immediately his aircraft signaled the enemy as being within range.

The British Government maintains, however, that alterations in the elevation of capital ship guns would be a breach of the Washington Treaty and has advised the United States and Japanese Governments to that effect.

That this is not an exclusively British opinion was shown by the proceedings in the House of Representatives at Washington on May 28, when Mr. Britten's amendment for elevating the guns in thirteen battleships suffered defeat by seventy-four votes to fifty-four. Representative Butler, chairman of the Naval Affairs Committee, roundly declared the proposal to be a violation of the treaty, adding that if it were adopted he would vote against the bill which he himself had introduced. "If it does not violate the letter of the treaty," he said, "then it does violate the spirit of the treaty, and I'll not stand for it." Such was the position when the British Government caused representations to be made on the subject at Washington and Tokio.

The Washington reaction to this move is indicated in a Reuter cablegram published here the other day, which says: "American officials who have

kept in touch with the matter seem satisfied that neither the French nor the Japanese Government would share the British view, though probably the Italian Government might. Therefore, if the question ever came to a vote among the signatory powers they believe that the British would be outvoted."

Curtis Wilbur, Secretary of the Navy, is quoted as expressing satisfaction that the question has been formally reopened. "It is a good idea," he thinks, "to have the question raised in order that it may be settled." He also foreshadows the Navy Department's intention to resubmit to Congress at the next session a full program for the renovation of old battleships, including the elevation of turret guns in order to give them the modern battle range.

Meanwhile, one hears persistent reports that France has already improved her battleships in this respect. Jane's *Fighting Ships*, an unofficial but well-informed navy yearbook, states in its current issue that the battleships *Bretagne*, *Lorraine* and *Provence* have had the elevation of their big guns increased from eighteen degrees to twenty-three degrees, thereby lengthening their range to 25,150 yards.

If this report is well founded and the work has been done since the treaty was signed, it is strange that nothing has been heard of a protest to the French Government from any quarter. Japan is also credited with an intention to increase the elevation of her turret guns, which may explain why the British representations were addressed to Tokio as well as to Washington.

The treaty forbids "alterations . . . in caliber, number or general type of mounting of main armament." Consequently, from the legal viewpoint, everything hinges on the definition of "general type of mounting." So vague is the phrase and so open to varying interpretation that the authors can hardly have had in mind the specific question which has since arisen. Had they inserted the word "elevation," this present controversy could not have developed.

Some British critics have asked why, if American naval men attached so much importance to the question of range, they did not bring it up at the conference. The reason, I am informed, is that the British Fleet's advantage in range was not known until afterward. It certainly is not the custom of admiralties to broadcast details of their ships' artillery, but one would have thought that such matters, being so very germane to the broad object in view, would have been fully ventilated when the experts of the different navies sat around the conference table. Apparently, however, gun ranges and elevations were not discussed at all.

Britain stands to lose nothing by conceding the American claim. She may be apprehensive lest a big increase in the elevation of all American turret guns should result in her own fleet being outranged, in which case she might feel obliged to make similar improvements in her ships, at heavy expense. This contingency could surely be avoided by direct negotiation between the Navy Department and the Admiralty concerning the new angles of elevation proposed for the American ships. Given good will on both sides, there is no reason at all why the dispute should not be accommodated to their mutual contentment.

As for the conversion of coal-burning ships to oil fuel, the issue is rather less complicated. Here, also, the conference experts must have nodded, for the treaty is absolutely silent on the point.

American naval men naturally desire their fleet to be homogeneous in radius of action, to which end they propose to install oil-fired boilers in the six ships which at present burn coal. Congress has approved the plan, which would now be in course of execution but for the eleventh-hour blocking of the bill in the last session. No doubt it will come up again in December,

with every probability of going through, despite the British Government's protest that such conversion would infringe the treaty. Captain Knox, U.S.N., has already stated the case for conversion in *The Sun* with much force and lucidity.

The fact remains, however, that the very arguments which justify America's attitude on gun elevation can be urged against this plan of putting the entire fleet on an oil-burning basis, for it would give the American Fleet a definite lead over all others. The British Fleet, as now constituted, has nine coal-burning capital ships against America's six. Four of the British ships are to be scrapped when the new vessels, *Nelson* and *Rodney*, are commissioned, probably in 1926. From that date, therefore, five coal-burning units will remain in the fleet.

So far as is known, all ten ships of the Japanese Battle Fleet burn coal, though there are rumors of a plan to convert them to oil. Coal is also the fuel used for every capital ship in the navies of France and Italy. Thus, the handicap which the presence of coal-burning ships imposes on the American Fleet is shared by all the other fleets.

If the six American ships are converted to oil, the naval authorities here might demand money for making the same change in their five coal-burning battleships, and the long-suffering taxpayer would have to endure yet another turn of the screw. It is probably on these grounds that the British Government felt moved to protest, not with any wish to put obstacles in the way of American naval development.

Poisonous Gases are on Increase, League Informed

Baltimore *Sun*, 22 August, 1924.—Paris, August 21.—Poison gas holds all its old war terrors, but the bugaboo of microbes is not an imminent danger, according to the report of the League of Nations subcommittee appointed by the Temporary Mixed Commission for the Reduction of Armaments to consider the progress in chemical warfare so as to warn the world what war really means.

The subcommittee, composed of Viscount Robert Cecil, Admiral Aubrey Smith, General De Merinis and Colonel Reguin, drafted the report, which will be submitted at Geneva, but was published here today.

The report was based largely on detailed statements given the subcommittee by the leading chemical experts of the world, including Professors Andre Mayer, of the College of France; Angelo Angelli, of the Royal Institute of Florence; Jules Borget, of the Pasteur Institute of Brussels; Walter Bradford Canon, of Harvard; Senator Paterno, of the University of Rome, and J. Enrique Zannetti, of the University of Columbia.

They agreed in general that microbes were too difficult to spread and that preventatives were too adequate to make bacteriological warfare a menace of the near future.

Poison gases, however, the composite report of the experts' opinion says, have increased from thirty known at the outbreak of the war to 1,000, but fortunately nothing more dangerous than the thirty has yet been discovered.

"Nevertheless," Profesor Cannon reported, "we saw nothing during the last war comparable to the probable destruction of industrial centers and the massacre of civil populations in the event another important conflict occurs."

New War Weapons are Described to World Scientists

Baltimore *Sun*, 20 September, 1924.—Philadelphia, September 19.—Sweeping changes in weapons of war were described today by Major General C. C. Williams, of the War Department, in a paper read before world scientists, gathered here in observance of the centenary of the Franklin Institute. He exhibited slides showing the possibilities of the new weapons.

A semi-automatic rifle is being perfected for use as a shoulder weapon, General Williams said, as well as a .50-caliber machine gun to replace the wartime .30-caliber. New trench mortars of great accuracy; high-speed tanks, with guns in turrets instead of in the body of the tank; a 75-mm. field gun of 15,000 yards' range, compared to 9,000 feet in the war, and other inventions were detailed.

The 105 mm. gun has been replaced with a 155 mm., increasing the range from 12,000 to 20,000 yards. The 4.7-inch gun now hurls a projectile of 100 pounds 20,000 yards, whereas a forty-five pound shell formerly was used.

Air attacks on cities, General Williams said, would meet fire from a new anti-aircraft gun that propels a fifteen-pound shell with deadly accuracy. This, he said, "will prove as great a step in preventing the bombing of cities as the aircraft now existing make it possible."

To guard against American batteries being discovered by enemy observers, a "smokeless flashlight" powder is being developed, the speaker said. This leaves only a dull, bluish glow about the muzzle of the gun after the discharge. This powder explodes with less noise than that now used.

Defense guns for the Panama Canal, moving under their own power on railway tracks, can sweep the sea for twenty-three miles with sixteen-inch shells, General Williams said.

NAVIGATION AND RADIO

Telegraphing Colored Pictures

Washington *Star,* 28 August, 1924.—The pictorial art seems to have made another forward step or leap, and the account of it is not to be understood by most persons. We have come to accept so many scientific facts without being able to understand them that one more will make very little difference. The American Telephone and Telegraph Company announces that colored photographs have been transmitted from Chicago to New York. A colored picture was placed in a sending machine at Chicago and reproduced in the original colors within an hour in New York. In the account it is said, "the actual colors are not sent over the wire, but the colors are separated at the point of sending and reassembled when received." The explanation puzzles the understanding more than the statement that a colored picture was transmitted. The reproduction of pictures over a long distance by wire has been done before, though the custom is not general, but it may become so. The transmission of colored pictures, putting a painting or colored print in a machine at one end of a wire and reproducing it at the other end of the wire a thousand miles away, is most remarkable.

MISCELLANEOUS

Outlawing War

Washington *Post,* 8 September, 1924.—The Baltimore *Sun,* commending one of the world peace plans offered by Americans to the league of nations delegates at Geneva, says:

"The plan would undoubtedly bind us to act in cooperation with other nations with regard to war, and would, to that extent, curtail our right to independent action or nonaction. That is to say, we, in common with all other cooperating nations, would sacrifice certain prerogatives heretofore regarded as vital to complete sovereignty, but the sacrifices would be small and carefully protected, and the profits in peace and civilization would be immense. We would get a great deal for comparatively little. We would accept the principle of limited internationalism without jeopardizing any vital principle of nationalism."

The "prerogative heretofore regarded as vital to complete sovereignty," which the United States would be required to surrender, is that of exercising its own judgment as to when and how it shall go to war. This, the *Sun* thinks, is a small sacrifice. The people of the United States think otherwise.

Back of all the schemes for "outlawing war" is the idea of creating a power higher than nations, capable of compelling the nations to bow to its will. There is no escape from this idea, if there is to be an agreement among nations to employ force in putting down any nation that begins war. The *Sun* itself, discussing the proposed "league against war," remarks that the taxpayers of the United States will be assessed heavily for years to come "because there was no international machinery in 1914 through which a halt could have been called on the march of the armies to destruction." How could a halt have been called, if not by using force against the German Empire and its allies? That would have been "war involving the United States," and the decision to make the war would not have rested with the people of the United States, but with an organization composed mostly of foreigners.

Instead of preventing war, such an organization would probably encourage wars by making intolerable aggressions upon the free will of nations. Certainly the Americans, a high-spirited and powerful people, would not long permit any foreign organization to determine when and how the United States should go to war over some foreign quarrel. They would fight the organization, if necessary, to disentangle themselves from a situation that had reduced the United States to impotence in determining its own destiny.

The "outlawing of war" is a fine phrase, but it is only a phrase unless it means that the nations are to combine and use force against a nation starting a war. Insurrections and disorders are put down by force. The mere outlawing of piracy of insurrection would mean nothing unless backed by a force sufficient to suppress and punish offenders.

War is the continuation of a national policy that can not achieve its end except by using force. If a nation is so bent upon executing its policy that it is ready to use force, only superior force can stop it. The proclamation of the nations that war is outlawed would be scoffed at. War overrules law that is not backed by force. Unless law is able to make war it is not law, but merely the expression of a desire. When a nation makes war it makes law as it goes, and that law will prevail against any law, national or international, that is not made superior by force.

The loose thinking of many Americans in regard to "law" is responsible for too many laws, and is also at the bottom of the hazy notion that the nations, by mere fiat, can "outlaw" war. These Americans should read the *Federalist*. Hamilton says, "It is essential to the idea of a law that it be attended with a sanction: or, in other words, with a penalty or punishment for disobedience." Law is "a rule of action prescribed by authority." The very idea of "outlawing war" necessarily implies that force will be used against the outlaw.

The armed forces of the United States cannot be employed except in such manner as the Constitution prescribes. In order to join a world combine empowered to punish a nation for making war it would be necessary to amend the Constitution by taking away from Congress the power to declare war and placing this authority in the world combine. Thereafter the world organization could compel the United States to go to war, whether the people of the United States believed the cause to be just or unjust. What citizen in his senses can convince himself that the people will ever consent to such an arrangement?

The enthusiasts who wish to "outlaw war" try to evade this question by suggesting that the world organization would not be required to use force,

but could easily prevent war by such coercive measures as boycotting an aggressor's commerce, cutting off intercourse with him, applying financial pressure, etc. But this is begging the question, because these coercive measures give rise to war instead of preventing war. Several nations might refuse to obey or be unable to comply with the world league's orders. What would the world league do against these additional "outlaws," if it could not employ force? The end is easily foreseen—the world league itself would be "outlawed" by the superior force of war, creating "law" in the real sense of enforcing the will of an authority.

The idea that the United States will join a league to "outlaw war" is such stuff as dreams are made of.

Jutland and Modern Tactics

By Sir Herbert Russell, *The Naval and Military Record,* 6 August, 1924.—The belated publication of the official version of the Battle of Jutland has little more significance than as a concession to tradition. It adds absolutely nothing to what we already know; it clears up nothing concerning which we are still in doubt. It is confined to narrative, which often breaks into very purple patches for an official compilation. Even so, Lord Jellicoe has found occasion to join issue on the grounds of injustice to Admiral Sir Evan Thomas.

One thing the publication of this volume has inevitably accomplished: it has stirred into a glow the smouldering embers of controversy. Into this well flattened-out field of criticism I have no intention of entering. My only reason for referring to the book is because it has directly inspired some reflections upon modern naval battle tactics generally.

I do not think that those who displayed their wisdom after the event, and told the world just what Jellicoe might have done and should have done, quite realized that Jutland was the first fleet action the British Navy had fought since the days of Nelson. It meant the practical testing of a century of tactical theories. There is a curious tendency to cling to a formula, even when a particular formula has become a sheer anachronism. A stock phrase much favored by naval students is that methods have changed, but principles remain. This sounds like a very erudite conclusion, but I venture to submit that it is true only within limitations, and that we have virtually passed the extent of those limitations. Methods are the practical exposition of principles. When methods become revolutionized out of all original recognition, what is left of principle?

If this particular formula be true, then Jellicoe at Jutland might have based his principles upon Nelson at Trafalgar. Indeed, he has been reproached for wanting in the "Nelson touch." Again I venture to submit that the "Nelson touch" today can only exist in the fancy of a picturesque "naval expert." Consider the almost incredible difference in conditions. The primary essential to all tactical evolutions is motive power. Nelson had always to reckon with an unknown quantity. Trafalgar, planned in a wonderful series of perfect diagrams, developed into a confused drifting match through the failing of the wind. Today an admiral can scheme his movements with perfect certainty of being able to execute them, unless his ships are knocked-out by the enemy.

Nelson's tactics were all directed to one end, expressed in his favorite signal, "Engage the enemy more closely." Gunfire, with him, was but a medium to lead to boarding. Effective range was somewhere about half-a-mile. To cripple a ship so as to be able to lay her alongside and engage the grappling irons—that was the real objective of battle tactics in the Napoleonic days. I belive I am right in saying (I write from memory) that no ship was actually sunk by gunfire at Trafalgar. Of the nineteen ships which Vielleneuve lost the majority were captured by boarding, and the remainder,

badly damaged and dismasted, were destroyed in the heavy weather which followed the battle.

Modern naval battle tactics border largely upon strategy. An admiral plots his own dispositions upon the knowledge that he is likely to encounter an enemy whose strength and the mobile qualities of whose ships he approximately knows. This is tactics, pure and simple, but he has to reckon upon the many things which his opponent can possibly do to neutralize his plans, such, for example, as the "come-back" feint of the High Seas Fleet designed to bewilder the pursuing forces. This is strategical. No such scope existed in Nelson's time.

The genesis of naval tactics lies in getting the advantage of position. A ship end-on offers a better, although smaller, target than a ship broadside on, because she can be raked, and at the same time can only bring a portion of her own armament into play. For this reason the formation of line-ahead is almost as old as the use of artillery itself. In the days of tacks and sheets the principle of broadside fighting in rigid line was immutable. We still hold it to be so. Jellicoe's deployment was aimed at getting upon the best line of bearing with regard to the German Fleet, but there is this great distinction; in the olden days the line which secured the weather gage had the tactical mastery. Now you can only force your adversary to conform to your own movements by virtue of superior mobility. If he is faster than you, he may make a turn-away and break back out of range. That is why I find it impossible to concur with those who still hold that speed is but of minor importance to battleships and that rigidity of line is the governing principle. Jellicoe admits how all his tactical calculations were upset by the discovery that an enemy battle squadron, which he credited with a speed of 20 knots, actually developed 23 knots.

I have said that there can be no "Nelson touch" today. Destroyers, submarines, airplanes, smoke screens, mines, and other methods of modern warfare, which were wholly undreamt of in Nelson's days, merely give a hostage of suicide to slap-dash tactics. Nelson could always measure the full degree of his risks. They were all on the surface of the water and confined to the number of sail in sight. Nowadays it is the unknown quantity which has to be guarded against. At Trafalgar it was simply a case of matching ships-of-the-line against ships-of-the-line. At Jutland it was a case of matching ships-of-the-line against the Lord knows what! How can we say that principles remain unchanged in face of such a revolution of conditions? As well apply the "Up Guards and at 'em!" heroics in military warfare. The machine-gunner would very effectively retort, "No, you don't!"

The old tactical principles—eminently sound—were always practiced within a very limited field. Ships did not begin "pouring in" broadsides until they were within almost a thousand yards of one another. The black powder smoke must have been horrible, but there was the target all the time, waxing and waning through the rolling smother. The word "visibility" was unknown then. Jellicoe, in his own version of Jutland, emphasizes the point of how seriously invisibility complicated his tactical problems—not only the inevitable obscurity of battle vapors and long distances, but the artificial obscurity of smoke screens.

A battle fought at high speed, at horizon ranges, and spreading over many wide leagues of ocean is a proposition for which the old tactical principles never provided. The thing had been rehearsed in our own time in many periods of exercises and maneuvres, but the reality brought conditions which had not—could not—have been foreseen. High mobility is the chief upsetting factor of preconceived ideas in naval battle tactics. You can never tell what your enemy may do, in the obscurity of the far-flung conflict, when he has the mechanical ability to do so many things. Admiral

Scheer's "come back" feint was not new; it was not a surprise to Jellicoe, but it succeeded to this extent: it dislocated the development of his own plan, necessitated a hasty change of formation, and threw the fleet into some temporary disorder, during which time the Germans had regained their course of flight.

If I may permit myself any criticism of the tactics of Jutland, it is that Jellicoe was too much restricted by traditional principles. He might have made very much more use of his destroyer flotillas than he did, in keeping them bound to the screening formations, which are all very well in the set pieces of tactical exercises. I believe he himself realizes this. At least, I judge so from his book, *The Grand Fleet*. He describes (p. 362) an attack by German destroyers upon the line he was leading, in which the tracks of about twenty torpedoes were reported by various ships, and says: "The captain of the *Collingwood*, in remarking upon the destroyer attack, added: 'The great value of this form of attack on a line of ships is, to me, an outstanding feature of the battle fleet action.'"

Can a modern fleet action ever be conclusive? In other words, is it possible to have another Trafalgar under the conditions of present-day sea warfare? Theoretically, we can say that it is. We can see now how Jutland might have been an overwhelming victory, but the perception that comes after the event is, I fear, of but little value for future guidance. The conditions which denied victory to Jellicoe at Jutland are pretty sure to occur in any big battle fought at high speed and amid the confusion of obscurity, interference with signalling, wareness as to submarines and mines, and the like, which it will be the aim of both sides to heighten as far as possible. The fog of war did not greatly matter at Trafalgar. The ships clung together and fired between the rifts in the murkiness. Nowadays they begin the battle at more than twenty times the distance apart, and when they vanish it is impossible to say in which direction they may be heading. Cruisers and destroyers keeping touch with them (or trying to do so) are equally swallowed up. The air arm will introduce an element which was absent at Jutland. Just what effect this will bring upon capital-ship tactics can only be a matter of theory, but it at least means yet another nail in the coffin of the old principles.

Revised Rules of Warfare

HAGUE COMMISSIONS REPORT.—*Army, Navy and Air Force Gazette*, 9 July, 1924.—A dispatch from Sir Rennell Rodd, first British delegate to the International Commission for the Revision of the Rules of Warfare, is now published in the form of a Command Paper (No. 2,201). The Commission assembled at The Hague on December 10, 1922, and concluded its labors on February 17, 1923.

The work of the commission was the outcome of a resolution passed by the Washington Conference on February 4, 1922, in the following terms: "Do existing rules of international law adequately cover new methods of attack or defense resulting from the introduction or development, since The Hague Conference of 1907, of new agencies of warfare? If not so, what changes in the existing rules ought to be adopted in consequence thereof as a part of the law of nations?"

It was agreed at Washington to exclude from the jurisdiction of the commission rules or declarations relating to submarines, and to the use of noxious gases and chemicals already adopted by the Washington Conference. The investigation was to be limited to aerial warfare and the use of "radio" (radio-telegraphic, radio-telephonic, and radio-goriometric apparatus) in time of war. The powers represented on the commission were Great Britain, France, Italy, the United States of America, Japan and The Netherlands. The British delegates were Sir Rennell Rodd and Sir Cecil Hurst.

Sir Rennell Rodd's dispatch gives the commission's report in two parts: Part I dealing with radio, and Part II with aircraft. Part I, it would appear presented relatively few difficulties. Part II, on the other hand, had two outstanding issues of difficulty: namely, aerial bombardment, and the right of visit and search by aircraft. On the former question agreement was reached, but the second question remained without final solution.

Among the twelve rules drafted with regard to the use of radio in war are the following: "Belligerent and neutral powers may regulate or prohibit the operation of radio stations within their jurisdiction. The erection or operation by a belligerent power or its agents of radio stations within neutral jurisdiction constitutes a violation of neutrality on the part of such belligerent as well as on the part of the neutral power which permits the erection or operation of such stations. The transmission by radio by a vessel or an aircraft, whether enemy or neutral, when on or over the high seas of military intelligence for the immediate use of a belligerent is deemed a hostile act, and will render the vessel or aircraft liable to be fired upon. Belligerents are under obligation to comply with the provisions of international conventions in regard to distress signals and distress messages as far as their military operations permit."

Part II (Chapter I) of the report deals with the identity of aircraft and the necessity for bearing a distinguishing mark. According to Article 12 (Chapter II), "in time of war any State, whether belligerent or neutral, may forbid or regulate the entrance, movement, or sojourn of aircraft within its jurisdiction."

Chapter III deals with the status of belligerent aircraft, their differentiation from civil aircraft, and the use of Red Cross aircraft in time of war.

In Chapter IV the following rules are laid down: "The use of tracer, incendiary or explosive projectiles by or against aircraft is not prohibited. When an aircraft has been disabled, the occupants, when endeavoring to escape by means of a parachute, must not be attacked in the course of their descent. The use of aircraft for the purpose of disseminating propaganda shall not be treated as an illegitimate means of warfare."

On the subject of bombardment no difficulty was found in reaching an agreement that there are certain purposes for which aerial bombardment is inadmissible: "Aerial bombardment for the purpose of terrorizing the civilian population, of destroying or damaging private property not of military character, or of injuring non-combatants is prohibited. Aerial bombardment for the purpose of enforcing compliance with requisitions in kind or payment of contributions in money is prohibited."

Bombardment is, in fact, only legitimate when directed at a military objective, that is to say, an object of which the destruction or injury would constitute a distinct military advantage to the belligerent. The bombardment of cities, towns, villages, dwellings, or buildings not in the immediate neighborhood of operations is prohibited. In all bombardments steps must be taken to spare as far as possible *inter alia,* buildings dedicated to public worship, art science, or charitable purposes, historic monuments, and hospital ships. "Zones of protection" may be established around certain buildings.

Chapter VII deals with the question of visit and search, capture and condemnation. The Netherlands delegation refused to accept the rules laid down in the chapter, and there was much divergency of opinion. More consideration will have to be given to the question before any unanimous agreement can be arrived at.

Secretary of War's Tribute to General Pershing

Army and Navy Register, 13 September, 1924.—The Secretary of War, during a radio address last evening, stated that the entire reorganization of the Army, under the national defense act, had been directed by General

John J. Pershing. He paid that officer the following tribute on the eve of his retirement:

Tomorrow this distinguished American will be retired from the active list of the Army. He goes with the soldier's satisfaction of having served his country admirably. In the Philippines, in Cuba, and in Mexico he acquitted himself with distinction. As commander-in-chief of the American expeditionary forces General Pershing successfully executed the greatest military problem that ever confronted this country. He commanded the largest body of men ever assembled under the American flag. It was necessary for him to face terrific pressure abroad and to bear the responsibility for critical decisions. He never wavered from the American purpose that it was wiser to strike for victory with an American Army. Six years ago today he justified his policy and determination. On that day troops of the United States Army went forward to victory at St. Mihiel and showed friend and foe alike what might be expected of trained American forces in action. History will accord General Pershing a place among the great military leaders of all time. Future generations will be inspired by his career and by the contribution made to the progress of the world by his mind and will.

There is a little in the way of honor that our national organization permits the Government to give to its outstanding servants. Old age advances. The years spent in loyal service by these men become but memories. It is not possible to retain them in positions of prominence. They are left with their memories and reminiscences to pass through the declining years, and is only too true that the nation itself often forgets what is due to its soldiers and sailors. Only historians keep alive the names of the great men of the past. Other countries find a way to make use of the advice, experience and wisdom of their outstanding public servants. Our best means of paying tribute to General Pershing, of recognizing our debt to him, of honoring him, is to take up now the task which he is compelled to relinquish. He has organized a new army, an army of citizens. In the future as we have today, let us support his policy and continue to carry out his well-laid plans. By doing this we will give him the satisfaction of knowing that he has built the new defense policy on a sure foundation. We will give him the pleasure of seeing well served and well defended the great republic to whose service and to whose defense he has devoted his unselfish efforts throughout his life.

This is also an appropriate occasion for me to express my personal thanks to General Pershing for the support I have received from him while at the head of the War Department. When I needed advice I have received from him able and disinterested advice. When I needed the execution of an order I have received the most faithful and loyal execution of that order. It is a source of the utmost regret to me that I am about to lose his services as chief of staff. It is a great gratification to me, however, that I will be able hereafter to obtain his valuable advice, even though it be given in an unofficial capacity. All the world knows the value of the services which the general rendered to the country in France. Only a few of us have been privileged to know the real value of the services which he has rendered since the war. Those of us who have that knowledge consider him as valuable to the country in peace as he was in war.

CURRENT NAVAL AND PROFESSIONAL PAPERS

"The Value of Civil Aviation as a Reserve to the Royal Air Force in Time of War," by Air Commodore R. H. Clark-Hall, C.M.G., D.S.O., R.A.F. In *The Journal of the Royal United Service Institute,* August, 1924.

"The Anti-Submarine Campaign in the Mediterranean," by Captain C. V. Uskorne, C.M.G., R.N. In *The Journal of the Royal United Service Institution,* August, 1924.

"Naval Scares in the United States," by Archibald Hurd. *The Fortnightly Review.*

"Electric Transmission of Power for Propelling Machinery," by W. J. Belsey. *The Marine Engineer and Motorship Builder,* September, 1924.

"The Functions of Coast Fortifications in the Positive System of Coast Defense," by Major E. J. Cullen, C.A.C. *The Coast Artillery Journal,* September, 1924.

NOTES ON INTERNATIONAL AFFAIRS

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

FROM AUGUST 23 TO SEPTEMBER 23

LONDON AGREEMENT RATIFIED

DAWES PLAN IN OPERATION.—The protocol drawn up at the London Conference in August, embodying the agreements reached for putting the "Dawes Plan" into effect, was ratified in the French Parliament by a large majority, and in the German Reichstag the Railroad Bills carrying into effect the "Dawes Plan" and thus effectively sanctioning the London Agreement were passed by a vote of 314-127, or well over the necessary two-thirds majority. Although not yet approved by the British Parliament, the British Government was so confident of support for the protocol, that it was formally signed in London on August 30. Belgium, France, Great Britain (including the five dominions), Germany, Italy, Japan and Jugoslavia signed the document, which went into effect September 1.

Owen D. Young, former American representative on the committee of financial experts, was made temporary Agent General of Reparations Payments, to be succeeded shortly by S. Gilbert Parker, Jr., former Assistant Secretary of the U. S. Treasury. Of sixteen arbitral boards provided by the London Agreement, three must include American members.

LEAGUE OF NATIONS ASSEMBLY

OPENING OF FIFTH SESSION.—The fifth annual session of the League of Nations Assembly convened at Geneva on September 1. Premier MacDonald of Great Britain and Premier Herriot of France visited Geneva and on September 4 addressed the assembly, both virtually pledging their governments to support the principle of compulsory arbitration. In the course of the session, the assembly adopted a program for the codification of international law, and decided to call a committee of experts as a preliminary measure. A general plan for supervision of German armaments was worked out for use when the league should be called upon by the allied powers to undertake this task.

Aside from routine matters, however, the chief concern of the assembly was the problem of limitation of armaments and compulsory arbitration. A subcommittee of the committee on Reduction of Armaments, headed by

Dr. Edward Benes of Czechoslovakia, prepared a draft protocol of twelve articles, in substance as follows:

The essentials of Dr. Benes's project include the submission of all juridical disputes to the World Court of Justice, the compulsory arbitration of which would be recognized by all the signatories. All other disputes, namely, those political in character, would go to the Council of the League of Nations, which for the time being would sit as a court of arbitration and reach its decision by a unanimous vote.

When a conflict is brought before either Court or Council, the protocol provides for the dispatch of international supervisory commissions to see to it that none of the parties to the dispute shall begin mobilization, and these commissions shall reach their destination within the maximum time limit of eight days. Having decided that a state which refuses arbitration shall be branded as an aggressor and outlawed, the protocol provides for the immediate putting into force of sanctions.

All the signatories agree individually and collectively to assist the attacked state and give mutual support through furnishing raw materials, foodstuffs, credits and transports, and insure the safety of communications both by land and sea for the threatened state.

An important article authorizes the Council to set up permanent commissions to draw up plans for blockading an aggressor and for economic and financial cooperation.

After authorizing regional agreements, the protocol makes arrangements for an international conference on the reduction of armaments, which shall be convened in the shortest possible time. If within a time limit, to be determined by the signatories, this disarmament conference is not held or its conclusions have not been carried out, then all the signatories regain complete freedom of action.

DATE FOR ARMS CONFERENCE.—Although the Benes draft protocol had not yet been fully approved and presented in its final form by the Committee of Twelve on Armament Reduction, it was expected to receive the ultimate approval of the assembly for presentation to the member states. The committee also decided to recommend to the assembly that June 15, 1925, be set as the date for an international conference on disarmament at Geneva, as provided in the protocol, to which the United States and other non-member states should be invited. Convocation of this conference would be contingent upon ratification of the arbitration protocol by a majority of the League Council and by ten other states.

BRITISH FLEET AND LEAGUE.—In the course of the discussion of compulsory arbitration, Lord Parmoor, the British delegate, made a tentative pledge of Great Britain's willingness to use her fleet as a force behind arbitration, with the reservation that Great Britain would refuse to arbitrate questions of maritime law raised by the action of the fleet in such service. This pledge was subsequently withdrawn at the instance of the British Government.

The draft protocol, as finally worded, contained only the general provision that each member of the league should contribute the forces at its disposition, either economic or military, to back up arbitration.

CIVIL WAR IN CHINA

STRUGGLE FOR CONTROL OF SHANGHAI.—On September 3 actual hostilities began between the forces of the Tuchuns or military governors of the two important maritime provinces of China, Kiang-su and Che-kiang. The immediate cause of this conflict was the administration of the port of Shanghai. Though within Kiang-su Province, this port had for some years been controlled by a military commissioner appointed by the governor of Che-kiang.

In their efforts to gain control of Shanghai, the Kiang-su forces were supported by the Central Government of China, which on September 7 issued a mandate authorizing the Kiang-su leader to take over the Shanghai administration and overthrow his rival, and by General Wu Pei-fu as the real power behind the Central Government. On the other hand, the Che-kiang forces received financial aid and promises of military cooperation from Chang Tso-lin, in control of Manchuria. Thus the conflict took on the aspect of a struggle for supremacy between the Central Government and disturbing elements both north and south.

On September 18 the Che-kiang forces were weakened by a revolt of one of their three armies, and the fall of Shanghai appeared imminent.

A Peking dispatch to *The Times* states that the prevalent opinion in the capital is that Chang Tso-lin's plans depend upon the outcome of the conflict around Shanghai. If his Che-kiang allies in the southern war theater are successful, Chang is certain to march upon Peking. If things go the other way, he will think twice about assuming the offensive. Simultaneously, however, comes the news of the imminent collapse of the Che-kiang forces, following upon the desertion of one of General Lu's armies to the enemy. This may explain the formal declaration of war upon Chang by the Peking Government and the designation of General Wu Pei-fu as Generalissimo of the armies. Peking presumably feels in a position to assume the offensive in the execution of a calculated plan in which the Shanghai campaign was the first move. The aim is to lift China out of a condition of chaos by beating down in turn the two most formidable opponents of the Central Government. Sun Yat-sen in the south and Chang Tso-lin in the north.—New York *Times*, September 15.

WAR IN THE NORTH.—Upon warlike measures on the part of Chang Tso-lin, the Peking Government began concentrating troops on the Manchurian frontier, and on September 18 declared formal war against the Manchurian leader. With 200,000 troops in readiness, General Wu declared his ability to extend the power of the Peking Government throughout northern China in a short campaign.

FOREIGN FORCES AT SHANGHAI.—On September 9 over 1,000 marines were landed from British, United States, Japanese and other warships in Shanghai harbor, and positions were occupied on the boundaries of the international settlement. Ten or more naval vessels of various nationalities were in the harbor under the command of Admiral D. M. Anderson, R.N.

BOOK REVIEWS

THE NAVAL HISTORY OF THE WORLD WAR, Vol. I, Offensive Operations, 1914-15. By Captain Thomas G. Frothingham, U. S. R. 349 pp. $3.75. Harvard University Press, 1924.

A Review by Rear Admiral W. L. Rodgers, U. S. Navy

The writer of this *Naval History of the World War* has already shown his ability as a military historian, in a work written soon after the close of the war. Although much information necessary to a complete story will not be available for many years, yet so many of the chief leaders, both civil and military, belonging to all the combatant powers have set forth their views and apologies that a careful comparison with official papers enables painstaking students to arrive at approximate truths. Such an examination has been made by Captain Frothingham in his present volume, which carries the reader to the spring of 1915.

When naval officers read naval history, it is presumably for the purpose of instruction, and this objective is reached rather by a just appreciation of errors committed than by admiration for successes achieved. The author's clear and well-balanced narrative points out with a sure hand the errors on both sides but then, in some cases, leaves the reader to his own reflections to determine the underlying causes of these far-reaching mistakes.

Apparently, at the outbreak of the war, military and naval commanders and plan-makers on the general staffs knew better what orders they ought to give to their subordinates than either what they should do themselves or how they should coordinate the activities under their own control with those of co-equal departments of government. In a word, they were not sufficiently educated for their high tasks. Either, as in the case of the English Navy, they were insufficiently versed in the technique of great command, or, as in the case of the German Army, they knew little except army technique and did not realize how much of war lay outside their own familiar field. None of the general staffs seem to have been acquainted in any adequate degree, either with domestic industries or with foreign national diplomatic and commercial policies, or with the nature and sources of commodities necessary to the prosecution of war, which yet were not to be had except by importation. The result of all this was that, the civilian heads of governments being imperfectly instructed by the combatant services as to the probable demands of warfare, everybody, including military leaders themselves, had to learn the art of warfare for nations in arms during the course of the war by trial and error; whereas, the military leaders should have better prepared themselves to deserve the confidence of their country-

men by a wider preliminary acquaintance with all the varied demands that were made upon them, as to war, as to diplomacy, and as to economics.

The author opens with an account of the national policies of the opponents, beginning with that of the Germans. The German Army held a conventional view of warfare founded upon its great successes in 1866 and 1870. Many years before the war, a chief of staff of great force, thoroughly impregnated with Moltke's system, had devised a plan of campaign for a war on two fronts: i.e., a war against France and Russia. The plan assumed that Russia would be slow in mobilizing, so it put only a small containing force on the Russian frontier and assembled the great majority of the German troops on the Belgo-French line to overwhelm France by a quick enveloping movement in vast numbers through Belgium. This plan was drawn up before 1900 when Germany's navy was small and it took no account of England as an ally of France. In 1914, when the war broke, the author of the plan was dead and his less able successor made no arrangements with the German Admiralty to employ the then powerful fleet against the English opponent while the army was attacking France. It was a fatal mistake. In any war, there are two ways of overcoming an enemy: to attack the life of the armies in the field directly by bloodshed and to attack indirectly the lives of both combatants and noncombatants by depriving them of the economic means of support. Moreover, it is an axiom of war that success costs the least when the blow is struck with the utmost possible strength. In the present case, the German General Staff was led into presumption by dwelling too much upon the methods and victories of a previous generation and felt secure of triumph with a plan of campaign which was undeniably based upon deep and sound knowledge of land warfare, but which was so narrow and arrogant as to underestimate the competence of both the French and Russian armies, while it totally neglected England as an enemy and took account neither of the might of English seapower nor of the economic vulnerability on the sea of the British maritime empire, and particularly of England herself, the center of British effort.

So when the first German rush was balked at the Marne, and the hostile armies settled down in the trenches, the original disregard of naval aid entailed consequences which could not be remedied; for the early German unreadiness to strike at hostile shipping allowed British measures of maritime defense to keep up with development of German submarine attack, and eventually the pressure of the British sea-power broke the spirit of the hostile noncombatants. The German General Staff gave too much attention to *kriegspiel* and neglected to pursue the wider studies which are necessary to the highest class of leadership and so failed to coordinate with the navy, which it regarded as a secondary national arm. The English national plan of war was likewise defective in that apparently it had not even made office studies for raising and maintaining a great army. To be sure, Lord Haldane's organization of the territorial army worked admirably and the six divisions destined by it for overseas service were placed in France very promptly, but there seems to have been undue apprehension of a German

invasion. The author mentions an assembly the day after the declaration of war which was attended by most of the cabinet and the leading men of the army to discuss sending the expeditionary force to France. Apparently, the navy was represented only by the First Lord of the Admiralty, Winston Churchill, and he was an ex-army officer. It was decided that the danger of invasion would not permit all the expeditionary force to be sent to France. Had these distinguished army officers known as much as they should have known of the capabilities of the senior service, they would have understood the ability of the fleet to afford full protection. Here also, as in the case of the Germans, the army placed no proper reliance upon the navy, as it should have done.

A point of great importance in the prosecution of the war, which is not sufficiently brought out by Captain Frothingham, is the failure of the British Government to close trade with the enemy through neutral territory. Yielding to pressure of the business community, the government long allowed British shipping to supply neutrals with goods essential to Germany for the prosecution of the war. In this case, also, the British Cabinet was unacquainted with the fundamental principles of maritime warfare and the naval heads of the Admiralty did not insist on their observance. As the author forcibly points out, it is the task of every navy to fight for the control of the sea but he fails to emphasize that the object of battle is to interrupt the enemy's sea commerce and protect one's own. Victory which is not utilized to affect maritime communications is a waste of effort; yet at the beginning of the war, the British fleet having been yielded the control of European waters by the enemy without a contest, nevertheless the government made no good use of its advantage but rather abused it by restraining neutral commerce with hostile powers in order to profit by substituting British business with the enemy through neutrals. This subject was a topic of complaint by the United States while still neutral, and was the cause of much regrettable friction. Not until this country came into the war and insisted, was the British mastery of the sea fully exercised for the purpose of its creation: namely, the economic exhaustion of the enemy—until the blockade was stringently enforced, individual English business men profited by the consent of the people's government at the price of the blood of the people.

Yet the government was neither sluggish nor venal: it was merely ignorant of the art of war. Every nation maintaining an army and navy employs therein a body of public servants whose special duty is to master the art of war in its widest applications and to insist upon being heard when the country commits its destinies to war. It is not clear that such a voice was raised. This is far from suggesting that the military branch should overtop the civil administration as in Germany. It means only that all branches should cooperate for a common objective with full knowledge of each other's special problems and difficulties and capacities. At the beginning of the war this desirable condition was far from attainment by any government and perception and concert of action grew slowly, even within the activities of

single governments, and as for allied teamwork, that was still slower in maturing.

We may hope that the author will develop this matter of the cabinet's employment of blockade in continuation of his work.

After sketching the general strategic plans for the war, our author takes up the question of traffic protection. The Germans interned their merchantmen, so that the task of attack was the only one their navy had for solution, and it is instructive to see how thoroughly and ably they effected their policy. As already noted, the general strategic plan for the navy was scarcely commendable but the arrangements for raiding commerce were wonderfully good and correspondingly successful. There seem to have been two reasons which explain this success: one was that thorough administrative preparation and forethought in the way of selection of secret bases and arrangements for colliers to open the campaign was a chief element, and the other was that Berlin, in accordance with its general doctrine of military administration, left the captains on the spot to modify their procedure from day to day as occasion required. Thus it was that von Spee had the freedom of the sea for over four months until the Admiralty called him home. Until then, his success against commerce had had an administrative basis (and even in the battle of Coronel the tactical victory was the result of administrative skill, for it was owing simply to bigger guns better aimed); at last, he had an important strategic question before him and he went wrong. The naval objective assigned him by Berlin was to break through the blockade to Germany. Up to this time the secrecy of his movements had guarded him. He had ample coal and supplies with him and it appears that the continuance of secrecy would still be his best play, but at an assembly of his captains after rounding Cape Horn, he decided to destroy the naval station at the Falkland Islands, even at the loss of concealment in so doing. Count von Spee was correctly advised by several of his captains to avoid the Falklands to preserve secrecy as long as possible on his homeward dash but a thirst to strike some notable blow misled him. Even if the English squadron had not been there, nothing really serviceable for Germany could have been done. Besides the strategic error in going there at all, the German admiral made a poor tactical approach to the harbor, as is shown by the author. He assumed that if he found an enemy it would be in inferior strength; he was unprepared for the superior force he actually found. In short, in spite of the high training and valor of the German fleet and the administrative skill and fine personal qualities of its commander-in-chief, its military leadship can scarcely be termed as of a lofty order.

On the other hand, the author suggests that the British arrangements for subduing the hostile raiders might have been better: he thinks the British cruisers relied too much on a passive form of protection by patrol instead of an active safeguard by search and attack. The later events of the war confirm this view. As for the strategy of the English admiral in accepting battle at Coronel, the author heartily condemns it. It was another illustration of the English neglect of the study of war as an art.

One of the most far-reaching incidents of the early part of the war was the escape of the *Goeben* and *Breslau* from the English fleet. Here a study of the account by Captain Frothingham cannot fail to be profitable, the errors of the English being more instructive than the wisdom of the Germans. During the Balkan troubles preceding the war, the *Goeben* had been at Constantinople, where her presence had been an important diplomatic factor, aiding the German influence in Turkey. At the outbreak of the war she was about to leave Pola after an overhaul. With the *Breslau,* she had three possible objectives: to escape into the Atlantic, to attack the transports carrying the French Army of Africa to France, or to go to Constantinople, there to resume her diplomatic and military influence in Turkish affairs. The latter course she actually took and it was of major importance, yet neither the British nor French commanders-in-chief nor their Admiralties nor their Foreign Offices seem to have thought of such a thing. It illustrates once more that successful war rests largely on sound diplomacy and knowledge of foreign affairs. The French Admiralty issued a better set of instructions to its Mediterranean Fleet than did the English. At the British Admiralty the orders were unskilfully drafted; their writer noted down all his preoccupations as possibilities and virtually gave the command "attend to all these things." It was not a helpful order, for in substance it dealt only with the Western Mediterranean and in form it demanded too much, but the chief weakness in this short and momentous campaign was in the military soul and character of the British commander-in-chief. There is not the slightest ground for impugning either his courage or his seamanlike or administrative skill. His habit of mind, as shown by his actions, was to look for orders and say "aye, aye sir," and leave the consequences to his superiors. One cannot imagine that he had ever pondered upon the subject of divining the enemy's conduct by scrutiny and analysis of his situation. His objective was to please the Admiralty and his eyes and ears were directed toward London, more than toward the enemy which both he and the Admiralty were alike anxious to destroy. No doubt the British commander-in-chief was an accomplished ship-captain, but in war he proved unequal to the responsibilities of independent command in the presence of the enemy. He was made to be a subordinate. He needed someone to tell him what was best to do, but the Admiralty failed him and he failed the nation. It is unnecessary to summarize here the interesting details of Captain Frothingham's account. The fleet was most zealous to execute every suggestion and order from London and succeeded in burning much coal but although some of the captains did well, the result was nil.

The cabinet pleased the country, but made a great error, in appointing Lord Fisher as First Sea Lord soon after the war began, for he also, in spite of his great and deserved reputation, showed little knowledge of war. He was put into office on account of his great administrative skill exhibited in the same post some years previously. It has been whispered that in the interval his undoubtedly great powers had suffered seriously from advancing years. It is an objection always to be considered in reappointing an old

man to high office, but be that as it may. Lord Fisher turned the ship-building efforts of the navy toward providing a fleet of somewhat specialized type to enter the Baltic and enable a Russian Army to land on the shores of Germany. The consent of Russia was not previously gained to the plan and the development of the war rendered it an impossible scheme before the ships were ready. It was an unfortunate commitment of the industrial effort of England without reasonable basis. Lord Fisher made his reputation on administrative skill (to which he had devoted his life) and lost it in the conduct of naval war. There is no evidence that he had much studied the art of war; he was a naval reformer.

The last subject dealt with is the attack on the Dardanelles. Winston Churchill, the First Lord of the Admiralty, saw the great military importance of holding these straits as a means of preserving military and commercial communications with Russia, but the venture was badly planned in London where there was no one placed in complete charge and made responsible for the proper management of all. Cabinet and other officers seem to have thought of it casually and at odd times, and Churchill, the only one who perceived all the consequences of success, could arouse little interest in the rest of the cabinet. With such slight general concern for the outcome, things could only go according to the old French saying, "order, counter-order, disorder." It is a truism in naval warfare that a fleet's attack on coastal fortifications needs support by troops on shore to make success permanently effective, but in this case, such was Churchill's anxiety to win a victory of great—of overwhelming importance, that contrary to the canons, he employed the navy alone to force the passage of the Straits, and made a disastrous failure. But the fault was not wholly in London. Captain Frothingham's account suggests that perhaps in this campaign, also, the local admiral in command was too deferential to the wishes of the Admiralty, and failed to insist on his own views as to necessary preparations and army support. The admiral assented to the First Lord's plans, but without enthusiasm. The story raises the suspicion that he lacked the moral force which Napoleon so highly esteemed; that equal to refusing to command in a campaign whose principles he did not approve. It is a delicate matter, calling for much thought and reflection through years of service to know the line between due military subordination and undue subservience to the government's views when holding command of the highest responsibility.

The book closes with a pregnant allusion to the change in the character of the naval war after the first six months. The change came because neither side was well grounded in the principles of naval warfare when the war began. The errors of each were offset by those of the other. The losses by such superficiality are incalculable and inexcusable. Our Navy should be trained with the end of avoiding them. There were countless incidents of fine and gallant conduct to which the work makes slight allusion, but their narration would be out of place in its scheme, which is to deal with the high administration of war. The lesson the book teaches us all is to avoid errors in plans, particularly those for opening the war: for in our errors

lie our opponent's best opportunities. In the errors shown by history we can find our own profit in the preparation of our minds, no less than in the preparation of resources.

When the next war comes, the tactical and many other conditions cannot fail to differ much from the last: but the enduring lesson of this study of the outbreak of the war is the necessity for intelligent teamwork between the Foreign Office and the different combatant forces. Each should know something of the problems confronting all the others. In this country it is scarcely likely that the civil branches of the government will ever know as much as is desirable of combatant matters and, therefore, it is the more necessary that not only should our naval officers be soundly versed in strategy and tactics, (they get daily practice in administration) but they should know foreign policies and their probable developments. If they do not, there is no other class in the country able to take the necessary all-round view of hostilities as affecting all the activities of government. It is to be hoped that by means of the Examining Board and the War College this point of wide education may be pressed upon all officers of high rank.

SECRETARY'S NOTES

Membership

Present Membership, 4397. Changes since last report: New Members, 16. Resignations, 1. Total Increase, 15.

New members joining since last report:

Erskine, G. B., Captain, U.S.M.C.
Bloedel, G. F., Captain, U.S.M.C.
Henkle, C. W., Lieut., U.S.M.C.
Ward, J. G., Captain, U.S.M.C.
Griffin, Raphael, Captain, U.S.M.C.
Mitchell, H. W., Captain, U.S.M.C.
Cherbonnier, A. V., Lieut., U.S.M.C.
Hunt, L., Rear Admiral, (SC) U.S.N., Ret.
Buckley, W. W., Major, U.S.M.C.
Ramsey, D. J., Ensign, U.S.N.
Baldwin, H. W., Ensign, U.S.N.
Mathewson, S. A.
Maveroff, Mario
Nichols, S. Van B.
Bowman, G. M.
Corner, K. R.

Minutes of Annual Meeting 1924

Attention is invited to the Minutes of the Annual Meeting, published elsewhere in this issue, and in particular to the annual report of the Secretary-Treasurer, giving a summary of the activities of the Institute for the past year.

New Constitution and By-Laws

The new Constitution and By-Laws as amended at the annual meeting, in accordance with the ballot cast by the members, will be found published in full elsewhere in this issue.

Prize Essay 1925

The notice for the Prize Essay 1925 has been amended to accord with the changes in the Constitution and By-Laws just adopted; whereby the winner of the prize, if already a life member of the Institute, now gets the commuted value of a life membership. This places winners of previous years in the same status as other competitors.

For the information of members, there will be published in the next issue the names and authors of all prize winning essays since the foundation of the Institute.

Articles

The Institute desires articles of interest to all branches of the service, including the reserve force. Non-members as well as members may submit articles, and

authors receive due compensation for articles published. Compact, well digested articles are more likely to be accepted for early publication. In accepting articles for publication, the Institute reserves the right to have such articles revised or rearranged, where necessary, in order to bring them up to the required standard of articles published in the PROCEEDINGS—the cost, if any, to be deducted from the compensation due the author.

Address of Members

In the past, many errors have resulted from the habit of changing an officer's address as soon as his transfer orders are published in the papers. No change will be made in the future except upon receipt of notification by the member concerned. Reliance upon the former method may, in extreme cases, mean a delay of almost four months.

To insure the prompt delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers *notify the Secretary-Treasurer without delay of every change of address.* No responsibility can be accepted for failure to receive the PROCEEDINGS, where members fail to comply with this rule. Changes of address should reach the institute by the 25th of the month, to be effective for the issue of the PROCEEDINGS of the following month.

Coupons for Applications

For the convenience of members making application for membership or for subscription, or informing the Institute of changes of address, a number of blank forms will be found elsewhere in this issue. It is hoped that members will take full advantage of these in order to reduce clerical work of all concerned.

H. G. S. WALLACE,
Commander, U. S. Navy, Secretary-Treasurer.

MINUTES OF ANNUAL MEETING, 1924

In accordance with Article V, Section 1, of the Constitution and By-Laws the annual meeting was called in the Officers' Mess, U. S. Naval Aademy, at 4:30 P. M., October 10, 1924.

Rear Admiral Henry B. Wilson, U.S.N., Vice-president of the Naval Institute, presided.

The reading of the minutes of the last annual meeting was dispensed with.

The first stated business being the election of officers and the result of the balloting on the adoption of the new Constitution and By-Laws the previously appointed tellers submitted report of the voting as follows:

FOR ELECTION OF OFFICERS

For President:

Rear Admiral H. B. Wilson	723
Scattering	56

For Vice-president:

Rear Admiral R. H. Jackson	474
Rear Admiral W. W. Phelps	321
Scattering	18

For Secretary-Treasurer:

Commander H. G. S. Wallace	647
Lieut. Commander R. C. Smith, Jr.	156
Scattering	1

For members of Board of Control:

1. Captain W. G. DuBose (CC)	515
2. Brigadier General George Richards, U.S.M.C.	501
3. Captain W. T. Cluverius	500
4. Captain P. B. Dungan	496
5. Commander Byron McCandless	471
6. Lieutenant Commander M. S. Tisdale	432
7. Captain A. P. Fairfield	412
8. Commander W. S. Anderson	374
9. Commander J. T. Bowers	320
10. Commander C. C. Slayton	316
11. Lieutenant Commander P. V. H. Weems	211
12. Captain B. P. DuBois (SC)	198
Scattering	15

Thirteen ballots were not included in the above count, due to irregularities, such as failure to sign, blank ballot, or voting for more than the required number.

ON THE NEW CONSTITUTION

For the new Constitution	684
Against the new Constitution	16
Ballot forwarded, but not voting	9
Ballot forwarded, modified	3

The President then declared that, in accordance with the ballots cast, the new Constitution was adopted, and that the following officers were elected for the ensuing year, which, on account of the change in the date of the annual meeting, would be until February, 1926:

For President: Rear Admiral H. B. Wilson, U.S.N.
For Vice-president: Rear Admiral R. H. Jackson, U.S.N.
For Secretary-Treasurer: Commander H. G. S. Wallace, U.S.N.

For members of Board of Control:
Captain W. G. DuBose, (CC), U.S.N.
Brigadier General George Richards, U.S.M.C.
Captain W. T. Cluverius, U.S.N.
Captain P. B. Dungan, U.S.N.
Commander Byron McCandless, U.S.N.
Lieutenant Commander M. S. Tisdale, U.S.N.

The Secretary-Treasurer submitted the following report:

REPORT OF SECRETARY AND TREASURER

Mr. President and Members of the Institute:

The past year has been a busy one. It has brought with it a number of changes in the organization of the Institute, chief among which, perhaps, is the new Constitution just adopted.

CONSTITUTION AND BY-LAWS

The old Constitution had not been materially changed for a number of years, and was outgrown in many respects. That just adopted is a distinct improvement. It not only satisfies in a much better manner the needs of the present, but establishes a better working basis for the future.

Chief among the changes may be mentioned the following:

(1) The duties of officers are more clearly defined, and they provide in better manner for the Institute's needs.

(2) The membership is classified on a more rational basis.

(3) The admission of members, the collection of dues, including the handling of those in arrears, and the termination of membership are more adequately covered.

(4) Incorporation in the Constitution of a financial policy for the investment of the Institute's surplus funds. This will not only practically assure the safety of the Institute's funds, but the rules may also be of assistance to those of the membership who wish to invest conservatively.

(5) The elimination of the special reserve fund to guarantee the interests of life members. In view of the large assets of the Institute, this fund is no longer necessary.

(6) The change in the date of the annual meeting from October to February. This will enable the Secretary to report the audited annual statement at the meeting. It will also defer the selection of nominees for

the annual ballot until all officers have reported at the Academy, and thereby insure a wider choice.

(7) The increase in the life membership fee to a figure commensurate with the cost of publishing the PROCEEDINGS, including necessary overhead.

(8) The inclusion of a clause providing that, in case of dissolution of the Institute, the assets shall not inure to any person or persons. This is merely the formal statement of what has been the policy of the Institute from the beginning; its adoption prevents the raising at any time of the question of ultimate individual profit, and reasonably assures freedom from taxation.

MEMBERSHIP

The present membership consists of 3,673 regular members, 143 life members, 399 associate members, 4 honorary members, 177 members suspended for non-payment of dues, or a total of 4,397. Subscriptions are as follows: Domestic 253, Foreign 291, Total 544. In addition to the above, the Institute exchanges publications: Domestic 41, Foreign 16, and 55 copies to advertisers. The total circulation is thus at the present time 5,037.

The net changes for the year are as follows: Deaths 30; resignations 226; new members 154; members dropped 131; net decrease in membership 233.

The net loss in the year 1922 was 653; in the year 1923, 244; so it is apparent that the loss is decreasing, and the membership should, in a year or so, recover from the slump which not unnaturally followed the great increase during the war.

In that connection, I might mention the fact that the financial loss to the Institute from bad dues from members dropped has been considerable. An effort has been made to compile the statistics for the various years, with the following result:

		Total	Average per year
10 year period	1873-83	$ 457	$ 47.50
10 year period	1884-93	918	91.80
10 year period	1894-1903	1,301	130.10
10 year period	1904-14	684	68.40
6 year period	1914-19	157	36.17
1 year period	1920	2,729	2,729.00
1 year period	1921	5,491	5,491.00
1 year period	1922	1,404	1,404.00
1 year period	1923	877	877.00
1 year period	1924	not yet available	
Total—50 years		$14,018	

The Board of Control, having in mind the injustice to the Institute when dues remain unpaid and are uncollectible, has adopted a policy whereby the assistance of the Navy Department will be invoked to recover from members dropped the moneys due the Institute.

PROCEEDINGS

Commencing with the issue of January 1, a new cover has been adopted for the PROCEEDINGS, resulting in much favorable comment over the improved appearance. The PROCEEDINGS are still printed in Menasha, Wis., and, as the difficulties of printing at such a distance are constantly lessening, I see no reason for any change in the immediate future.

The following statistics are of interest:

Number of copies printed	60,600
Payments to printers	$15,912
Payments to authors	3,553
	$19,465

Overhead (PROCEEDINGS only)	9,289
Total cost	$28,754
Printing cost per copy	.321
Total cost per copy	.474

The Board continued this year the policy started last year of getting out occasional issues as a "Special Information Number." The September issue of this year was such a number. Its reception has been very favorable, and I trust it will be of real assistance to members who may be called upon to furnish information on the Navy.

The total income from dues and subscriptions is $15,632, leaving a net operating loss on the PROCEEDINGS of $13,122.

INSTITUTE PUBLICATIONS AND PURCHASED BOOKS

The total sales of Institute publications have amounted to $26,872, and of purchased books obtained from outside publishers $5,084. This has resulted in a profit of $6,851, which, in part, offsets the loss on PROCEEDINGS.

The total business of the Institute for the year has thus been $47,588, resulting in a total operating loss of $6,271. The income from interest has amounted to $6,9?0, leaving a net gain for the year of $649.

In order to put this upon the same basis as previous years, it will be necessary to add to this sum $3,767 of "Contingent Profits," a reserve set up against the books published during the year as a contingency against the probable unsold remainder of editions of these various books. When added to the net gain above, this gives a total of $4,416; but as there is practically always an unsold remainder of appreciable size, the setting up of a reserve is essential, and that practice has been instituted commencing with January 1, last.

CHANGE IN ASSETS

The net worth of the Institute today, in round numbers, is $177,000, an increase in the year of $1,?81. This is somewhat greater than the net gain reported above, but certain items, such as life membership fees and final settlement of the Wetmore legacy, were carried direct to surplus, and did not show in the profit and loss for the year. For the purpose of comparison with previous years, the "Contingent Profits" above referred to should be added also to increase in net worth, though its omission presents a better picture of the actual financial status of the Institute today.

OVERHEAD

Overhead is, of course, a considerable item, and every effort has been made to reduce it, not only by the elimination of unnecessary expense, but by an improvement in the methods of accomplishing various results. That the changes made have actually brought results is evidenced by the following table:

1920	$17,591	
1921	18,433	
1922	17,924	
1923	15,887	
1924	14,514	(on the basis of nine months, increased proportionately.)

BOOKS PUBLISHED AND TO BE PUBLISHED

The following books have been published during the year:

International Law, by Soule and McCauley.

Naval Leadership; With Some Hints to Junior Officers and Others, a compilation by and for the Navy.

Notes on Naval Communications, compiled by Lieutenant A. C. Kidd.
Naval Turbines, by Cox and Libbey.

Revised editions of the following books have been gotten out during the year:

Constitutional Law, by Fenton.
Naval Construction, by Robinson.

The following books are now in press:

Internal Combustion Engines, by Lind; new edition. Rights for this book were purchased from Ginn and Company.
Manual of Radio Telegraphy and Telephony, by Robison; 6th revised edition.
Principles of Naval Architecture and Warship Construction, by Manning and Schumacher. A new book which has taken the place of Robinson's *Naval Construction* as a textbook.
Notes on Naval Communications, 2d revised edition.
Celo-Navigation, by Dutton. This book is for use in conjunction with the regular other navigation textbooks. It is the first book, so far as known, to include the method and examples of the application of the new way of figuring time, which goes into effect on January 1, next.
Spanish Nautical Phrase Book and Reader, by Fernandez. Revised edition.
Constitutional Law, by Fenton. This book is being reprinted for use as a textbook at West Point.

The following books are to be revised during 1925:

International Law, by Soule and McCauley.
Groundwork of Practical Naval Gunnery, by Alger.
Naval Ordnance
Range and Ballistic Tables
Navigation, by Lofquist and Allen.
Naval Electricians' Textbook, Vol. I, by Bullard.
Naval Leadership

PRIZE ESSAY

Prior to 1918, essays were especially submitted in competition for the Naval Institute Prize, the names of the writers being in sealed envelopes, which were not opened until after the prize winning essay had been chosen. Commencing with 1918, no special articles were submitted, but the prize was awarded to the author of the best article which had appeared in the PROCEEDINGS in the preceding calendar year.

The Board of Control came to the conclusion that the change in the method of awarding the prize, while easier for the Board, resulted in a lessening of competition, and at the same time decreased both the interest in the prize and the distinction in winning it.

The Board, therefore, decided to return to the former practice of holding a special competition. The contest closes December 31, and awards under the new method will be made as soon as practicable after the first of the year.

ADVERTISING

For many years a certain amount of advertising has been carried in the pages of the Naval Institute PROCEEDINGS. The advertising rates may possibly have been sufficient at the time they were established, but in recent years have been much under those charged in other publications of corresponding character and circulation, and far below those necessary to secure an adequate return. It is little exaggeration to say that revenue derived barely paid for the printing cost.

Commencing early this year, the rates were more than quadrupled, and a contract entered into with an advertising agent, whereby, without relinquishing control in any way over the character of advertising to be accepted, nevertheless the return to the Institute is vastly greater, even after deducting a reasonable profit for the agent.

The transition to the new method has not yet been completed, and will still take several months, as the contracts already entered into at the old rates must, of course, be completed. Ultimately, the return from advertising will be greatly increased over that formerly received, and it may be that the advertising will eventually take care of the annual loss from the PROCEEDINGS. That goal is a long way ahead, but it is worth striving for; and I feel that the step taken this year is one of the most important, in a financial way, that has been taken in many years.

GENERAL

The general condition of the Institute is sound, financially and in every other way; and I feel that it has been, and will continue to be, of real benefit to the Navy. In the publication of books, it enables the departments of the Naval Academy to secure for the midshipmen distinctive textbooks in the several subjects, suited to the special needs of the Academy and the service at large, and at a price not greater, and in the majority of cases less, than that for which they could be obtained elsewhere, if indeed they could be obtained at all.

I feel that the Naval Institute PROCEEDINGS, in furnishing a medium for bringing before the service not only the matured opinions of the officers best qualified to speak on the various subjects, but also a compendium of useful professional notes and other information, and still further, in giving to the Navy the opportunity to discuss questions vital to its welfare, does a real service. My tenure of office as Secretary-Treasurer has lasted nearly two years, and will shortly terminate. I feel it incumbent upon me at this time, therefore, to express the conclusion which I have long reached, representing the most mature consideration. The duties of the office of Secretary-Treasurer are many and exacting, and cover a wide field; it takes time and thought to learn them, and much time to attend to them, even after they are learned. The changes in the office have in the past been far too frequent. The duty may well be regarded as semi-official in character and official in importance.

I believe that the time will come, and indeed has already arrived, when the importance to the Navy of the Naval Institute is such as fully to warrant the detail of a suitable officer to that duty, not as a side issue, but just as any other detail in the Navy is made. If my information is correct, that practice has long been followed by the various army publications, where the business done in no way approximates that of the Naval Institute. It should still be practicable to avoid hampering restrictions, to keep alive the freedom of discussion, and to accomplish, in no less degree, those objects for which, more than fifty years ago, the Institute was founded.

The report of the Secretary-Treasurer was adopted.

There being no further business, the meeting then adjourned.

H. G. S. WALLACE,

Commander, U. S. Navy, Secretary-Treasurer.

CONSTITUTION AND BY-LAWS[1]

ARTICLE I

Name and Object

SECTION 1. This association shall be called the UNITED STATES NAVAL INSTITUTE.

SEC. 2. Its object shall be the advancement of professional, literary, and scientific knowledge in the Navy.

ARTICLE II

Headquarters

The headquarters of the Institute shall be at the United States Naval Academy, Annapolis, Maryland, or in such other place as the Board of Control may select.

ARTICLE III

Officers

SECTION 1. The officers shall be as follows: a President, a Vice-president, six (6) Directors (of whom the senior in rank, in the absence of the President and Vice-president, shall be empowered to sign documents and perform other necessary administrative functions, under the title of Second Vice-president), and a Secretary-Treasurer.

SEC. 2. These officers shall, collectively, constitute the Board of Control of the Institute.

ARTICLE IV

Membership

SECTION 1. Membership of the Institute shall consist of the following classes: Regular Members, Regular Life Members, Associate Members, Associate Life Members, and Honorary Members.

SEC. 2. Regular membership and regular life membership shall be available to officers of the U. S. Navy, Marine Corps, and Coast Guard.

SEC. 3. Associate membership and associate life membership shall be available to officers of the U. S. Naval Reserve Force and Army; to American citizens in civil life, at home and abroad, who are interested in the objects of the Institute; and to foreign military and naval officers and distinguished civilians; provided, that the number of foreign members shall be limited to one hundred (100).

SEC. 4. The President of the United States, the Secretary of the Navy, and the Assistant Secretary of the Navy, shall be Honorary Members, *ex-officio*, during their tenure of office.

SEC. 5. All questions arising in regard to classification of members shall be determined by the Board of Control.

SEC. 6. Regular Members and Regular Life Members who resign from the U. S. Navy, Marine Corps, or Coast Guard, subsequently to joining the Institute, shall be transferred to the corresponding classes of associate membership.

SEC. 7. Regular Members and Regular Life Members in good standing shall be entitled to vote on any questions before any meeting of the Institute, or before the Institute as a whole. Associates may not have a vote, but may attend all meetings of the Institute, and shall have the privilege of the floor.

[1] As amended at the Annual Meeting, October, 1924.

SEC. 8. The rights and privileges of every member of each class shall be personal to himself, and shall not be transferable.

SEC. 9. Every person admitted to membership in the Institute shall be subject to its Constitution and By-Laws, including any amendments and additions that may be made thereto from time to time.

SEC. 10. Membership shall continue until receipt of the member's resignation in writing, or until the Board of Control, under circumstances hereinafter provided, shall drop or otherwise sever the member's name from the roll.

ARTICLE V

Admission of Members

SECTION 1. Persons qualified for regular membership under the preceding article will be admitted upon their own application, and upon payment of dues for one full year.

SEC. 2. Candidates for associate membership will make application to the Secretary-Treasurer on an approval form, which application must be endorsed by a member of the Institute in good standing. The Board of Control at the next regular meeting will ballot upon the applications received, and applicants receiving a favorable vote from two-thirds of the members present shall be considered elected.

SEC. 3. When a candidate is elected, the Secretary shall give him notice thereof, but his name shall not be entered on the roll, nor shall be possess the privileges of membership, until he shall have paid his dues for one full year; and if payment be delayed more than four months from date of his election, the same shall be void, unless the Board of Control shall otherwise direct.

SEC. 4. Membership for a single year, or for a definite time, shall not be accepted.

SEC. 5. Regular Members so desiring shall be transferred to the class of Regular Life Members, upon their own application, and upon payment of the required fee for life membership. Associate Members shall be similarly transferred to the class of Associate Life Members, subject to the approval of the Board of Control.

ARTICLE VI

Fees and Dues

SECTION 1. There shall be no entrance fees, but one full year's dues shall be payable upon joining the Institute. In case of members joining other than at the beginning of the year, the unexpired portion of dues paid shall be credited toward the following calendar year, subject to such rules as the Board of Control may prescribe.

SEC. 2. The annual dues for Regular Members and Associate Members shall be three dollars, payable in advance on the first day of January in each year. Bills shall be mailed to members at least one month in advance of the date when dues are payable, and any member who has not paid such dues within three months after such date shall be subject to action in accordance with ARTICLE VII.

SEC. 3. The fee for life membership, whether regular or associate, shall be one hundred dollars; but if any Regular Member or Associate Member shall have paid dues for the year in which he applies for life membership, or shall have paid dues for any future years, the amount so paid shall be credited toward the fee for life membership.

SEC. 4. Any member of any class of membership whose mailing address requires foreign postage shall pay fifty cents per annum additional therefor.

SEC. 5. Each Regular and Associate Member and Life Member (in return for membership dues and fees paid), and each Honorary Member, shall be entitled to receive a copy of the PROCEEDINGS, as published.

SEC. 6. The subscription price of the PROCEEDINGS to non-members shall be determined by the Board of Control, but shall not be greater than twice the annual membership dues.

ARTICLE VII

Resignations, Arrears, Expulsion, Etc.

SECTION 1. Members desiring to terminate their membership in the Institute shall submit their resignations in writing to the Secretary-Treasurer, and shall continue to be liable for dues until the date of receipt of such resignations; provided, that resignations of members in arrears shall not be accepted until all arrears are paid, and if not paid within six months after notification, the member wishing to withdraw shall be dropped. Members voluntarily resigning from the Institute will in no case be entitled to any refund of dues or life membership fees paid.

SEC. 2. Members in arrears more than three months may, in the discretion of the Board of Control, be suspended from all rights and privileges until such arrears are paid; and members in arrears more than one full year shall be subject to be dropped.

SEC. 3. At the meeting of the Board of Control in January of every year, the Secretary shall lay before the Board a list of all members whose dues for the previous year shall be still unpaid; and the Board of Control, unless for good and sufficient reason it shall decide otherwise, shall direct that the names of such members in arrears be dropped from the roll; provided, that such members may, within one year, on their own request, be reinstated, at the discretion of the Board of Control; and after the lapse of one year shall be subject to election, in the same manner provided for new members; and provided further, that no member may be reinstated or readmitted except upon payment of all arrears.

SEC. 4. When any Regular Member or Regular Life Member is dismissed from the Navy, Marine Corps, or Coast Guard, as the case may be, or resigns for the good of the service under circumstances involving moral turpitude, or when any member is convicted of a felony, he shall, at the discretion of the Board of Control, be dropped from the roll of the Institute; provided that the unexpired portion of dues paid shall be refunded to such member; and provided further, that in the case of Life Members who purchased their life membership, the amount to be refunded shall be computed in accordance with the rule hereinafter laid down in ARTICLE XIII, Sec. 2, for the refund in the case of dissolution of the Institute.

SEC. 5. In time of war, or when it shall appear to the Board of Control that the continued membership of any member is contrary to the best interests of the Institute and of the Navy, the Board of Control shall have authority to drop such member from the rolls, refunds to be as prescribed in Sec. 4 of this article.

SEC. 6. Nothing herein contained shall prejudice the rights of the Institute to the legal recovery, or recovery through other processes, of all arrears of dues up to the date when a member is dropped from the roll.

SEC. 7. The name of every member dropped for any cause whatsoever shall be entered in the minutes.

ARTICLE VIII

Nomination and Election of Officers; Annual and Special Meetings

SECTION 1. The Board of Control shall, before the first day of October in each year, appoint a nominating committee of three Regular or Regular

Life Members, none of whom shall be a member of the Board of Control, whose duty shall be to make nominations for the elective offices of the Institute.. Additional nominations may be made by members so desiring, provided that requests therefor shall be signed by six (6) Regular Members in good standing.

SEC. 2. Only Regular Members and Regular Life Members of the Institute on the active list of the U. S. Navy, Marine Corps, or Coast Guard shall be eligible for election to the offices of President, Vice-president, and Director of the Institute, and no person shall be eligible for the office of President for more than two years consecutively. The Board of Control may make such further rules regarding eligibility as shall seem desirable from the standpoint of the Institute.

SEC. 3. Election shall take place at the annual meeting, which shall be held on the third Thursday in February of each year. Tellers shall be appointed by the Board of Control, in advance of the date set for the meeting. The candidates receiving the highest number of votes for the respective offices of President, Vice-president, and Secretary-Treasurer, and the highest six (6) for the office of Director, shall be declared elected, and shall assume the duties of their respective offices from that date, and shall hold office until their successors have been elected and have qualified.

SEC. 4. Absent members, who have the constitutional right to vote, may vote by proxy at such elections, and similarly upon proposed changes in the Constitution and By-Laws, and upon such other questions as the Board of Control may feel it desirable to bring before the membership. Each proxy must be signed by the member whose vote is to be represented. Ballots shall be mailed to members entitled to vote at least two months in advance of the date set for the meeting, notice of which shall be given.

SEC. 5. At the annual meeting the order of business shall be as follows: (a) Minutes of previous meeting; (b) Report of Secretary-Treasurer, including financial statement for the preceding year; (c) Report of tellers, and result of the election announced; (d) Report of special committees, if any; (e) General business.

SEC. 6. A special meeting of the Institute may be called at any time and place at the discretion of the Board of Control, the call for the meeting to be issued at least thirty days prior to the date set, stating the business to be considered. No other business shall be transacted at such special meeting.

ARTICLE IX

Duties of Officers

SECTION 1. The President shall preside at meetings of the Institute and of the Board of Control at which he may be present. If not present, the Vice-president shall preside; and if he be absent, the senior in rank of the Directors shall preside.

SEC. 2. The Board of Control shall consist of the President, the Vice-president, the six (6) Directors, and the Secretary-Treasurer. The duties of the Board of Control shall be the management of all financial and administrative business of the Institute, including the censorship, printing, and control of its publications. The Secretary-Treasurer shall be its medium of communication, and the recorder of its transactions. Regular monthly meetings of the Board of Control shall be held when called by the Secretary-Treasurer, and he shall issue a call for a special meeting at any time, upon the written request of two members of the Board. A quorum shall consist of four members.

SEC. 3. The Board of Control shall have the power to employ and compensate such persons as it may consider necessary to enable the Secretary-Treasurer to perform his duties in an efficient manner, and to conduct the affairs of the Institute on a business-like basis.

SEC. 4. Casual vacancies in the offices of the Institute may be filled by the Board of Control until the next annual election.

SEC. 5. The Board of Control may remove any officer of the Institute for cause, at a special meeting of the Board of Control called for the purpose, after such proceedings as the Board may determine; provided that at least five members of the Board of Control shall be present, exclusive of the officer under trial, and a two-thirds vote shall be necessary for removal.

SEC. 6. In case of prolonged absence or disability of any officer of the Institute, except the President, the Board of Control shall have the power to declare the office vacant, and to fill the vacancy as in case of resignation.

SEC. 7. The Secretary-Treasurer shall attend all meetings of the Institute and of the Board of Control, and shall keep minutes of the proceedings of each meeting; he shall keep a register of the members, in which shall be recorded all changes, and an authenticated copy of the Constitution and By-Laws in force; keep the accounts of the Institute in books by the system known as double entry bookkeeping, showing dues receivable and collected from members, and all other funds receivable and collected. Under the authority of the Board of Control he shall be the disbursing and purchasing officer of the Institute, and the custodian of its funds, securities and investments. All funds received by him shall be deposited in such bank or banks as may be selected by the Board of Control, in an account in the name of the United States Naval Institute. All disbursements shall be by check, and in no other manner whatsoever. He shall submit to the Board of Control monthly, and to the Institute at the end of each year, a statement of his accounts, which shall show, as far as possible, the income and expense, and assets and liabilities of the Institute, together with such other information as the Board of Control may desire. His accounts shall be audited at the end of every calendar year, and at such other times as the Board of Control may direct, and in such manner as they shall determine. The audited annual statement shall be published in the first available issue of the PROCEEDINGS. The Secretary-Treasurer shall attend to all correspondence and keep a record thereof; give receipts to members when dues are paid in cash, and when requested; give due notice of meetings of the Institute and of the Board of Control; have charge of the clerks and other employees of the Institute; distribute and keep a record of publications of the Institute, and an inventory of publications and other property on hand. The book of accounts of the Institute shall be open to inspection by any member. The Secretary shall, in general, conduct the ordinary business of the Institute, subject to the direction of the Board of Control. He shall be the editor of the PROCEEDINGS.

ARTICLE X

PROCEEDINGS *and Publications*

SECTION 1. The Board of Control shall arrange for the publication of such papers, books, and other documents as may be calculated to advance the objects of the Institute.

SEC. 2. There shall be published quarterly, or as much oftener as the Board of Control may decide, United States Naval Institute PROCEEDINGS, containing such papers and documents as may be approved by the Board of Control, together with editorial and professional notes deemed of value to the naval service.

SEC. 3. The PROCEEDINGS, books, and other publications shall be copyrighted in the name of the U. S. Naval Institute.

SEC. 4. The Board of Control shall regulate the prices of books and publications, the size of editions, and in general, have full control of their production and distribution.

SEC. 5. The Board of Control shall have full authority to regulate the compensation to be paid to the writers of articles and books, and may enter into such contracts with authors as may be calculated to further the interests of the Institute.

SEC. 6. The Institute shall not be responsible for statements of opinions advanced in papers or printed in its publications; the respective writers only shall be responsible.

ARTICLE XI

Annual Prize Essay

SECTION 1. A prize of two hundred dollars, with a gold medal and a life membership in the Institute shall be offered annually for the best essay on any subject pertaining to the naval profession, the rules for the contest to be as prescribed by the Board of Control.

SEC. 2. In the event that the author of the prize essay for any year is already a medalist, he shall be given a gold bar suitably engraved, in lieu of the medal; and in the event that he is already a life member, the commuted value of the life membership shall be paid in lieu thereof; this shall be fixed at such an amount as would, according to the age of the author and his expectation of life according to the American Mortality Tables, purchase an annuity equal to the annual dues, interest being taken at five per cent; provided that the sum shall in no case exceed one hundred dollars.

SEC. 3. The award of the annual prize shall be made by the Board of Control voting by ballot, and without knowledge of the names of the competitors.

SEC. 4. If no essay is adjudged of sufficient merit to receive the prize, "Honorable Mention" may be awarded in lieu thereof, and in either case additional essays may also receive "Honorable Mention." The authors of essays awarded "Honorable Mention" shall receive such compensation as may be adjudged by the Board of Control, but not including a life membership. Not more than one life membership shall be awarded in any one year.

ARTICLE XII

Investment of Funds

Surplus funds may be invested under the direction of the Board of Control, in and upon the following conditions:

(1) Twice each year, or oftener if necessary, a complete list of the Institute's investments shall be submitted to a nationally known financial organization, not a dealer in securities, with a request for examination, report, and recommendation.

(2) Advice shall similarly be asked before new investments are entered into.

(3) The principle of diversification shall be strictly adhered to, and future investments shall be limited to a total of $10,000 par value in any one issue. Diversification as to types of securities shall also be followed, but investments shall in general be confined chiefly to the more stable fields, namely railroads, public utilities, United States or Canadian government and municipal bonds.

(4) Inasmuch as the Institute is an educational institution, and therefore not subject to taxation, it shall not be the policy to invest in tax-exempt securities.

(5) While a reasonable marketability is desirable, yield shall not be unduly sacrificed in order to obtain a high degree of marketability; provided that all holdings, whether listed or unlisted, shall be readily marketable.

(6) Only bonds of seasoned companies, or guaranteed by such companies, shall be invested in, and the companies must be ones which

over a period of years have shown a healthy growth, and whose operations are carried on in a good territory.

(7) In the case of railroad bonds, the earnings must average over a period of years (excepting the period of government operation) at least one and one-half times the interest charges, and the road must be part of a standard system; or, in the case of terminal bonds, must bear the guarantee of such railroads.

(8) In the case of public utilities, the earnings must average for the preceding five years at least twice the interest charges, with a minimum in any one year of at least one and three-quarters times the interest charges.

(9) In all the above cases, the bonds shall be a mortgage on property, having a substantial equity (excluding stock, inventories and good will) at least fifty per cent in excess of the amount of the issue and all issues to which it is subject. Exception shall be made only in case of debenture bonds of long established companies of the highest investment character and rating.

(10) In considering guaranteed bonds, due cognizance shall be taken of the fact that such guarantee is of the nature of a debenture obligation of the guarantor.

(11) In all the above cases, if the mortgage is not a closed issue, there shall be a clause providing that no future bonds can be issued under that mortgage except for improvements, and only to the extent of eighty per cent of the cost of such improvements; and then only in case the earnings for the past two years shall be at least one and three-quarters times the interest charges, including interest on the proposed issue; or such other equivalent guarantee as may be adequate to protect the bonds already issued under such mortgage.

(12) In the case of industrial bonds, the investment shall be limited to strictly first mortgage bonds of seasoned companies in stable industries, with earnings showing, in each of the preceding five years, at least two and one-half times all interest charges, and the mortgage shall be a closed issue.

(13) In the case of real estate investments, these shall be confined exclusively to first mortgage bonds, where the mortgage is sixty per cent or less of a conservative appraised valuation of the property; but no real estate investment shall be taken on property not as yet constructed.

(14) It shall be the practice to have all securities registered in the name of the United States Naval Institute, both as to principal, and, when the type of bonds permit, as to interest also.

ARTICLE XIII

Income and Property

SECTION 1. The income and property of the Institute, from whatever source derived, shall be applied solely toward the promotion of the objects of the Institute, and no portion thereof shall be paid or transferred, directly or indirectly, by way of dividend, bonus, or otherwise by way of profit, to the persons who at any time are or have been members of the Institute, or to any of them, or to any person claiming through any of them: Provided that nothing herein contained shall prevent the payment in good faith of remuneration to any officers or employees of the Institute, or to any member of the Institute, or other person, in return for any services rendered to the Institute.

SEC. 2. In the event of the winding up or dissolution of the Institute,

each Life Member who purchased his life membership shall be entitled to have refunded to him that part of the life membership fee paid by him as shall be represented by a fraction, in which the numerator shall be the member's future expectation of life, according to the American Mortality Tables, and the denominator shall be the sum of his future expectation of life plus the number of years already elapsed since the life membership was purchased, the nearest whole year being taken in all cases. If, after the satisfaction of all debts and liabilities, there remain any property whatsoever, of any kind, the same shall not be paid or distributed among the members of the Institute, but shall be given or transferred to some other institution or organization, as may be determined by the members of the Institute at or before the time of dissolution.

ARTICLE XIV

Amendments to Constitution and By-Laws

SECTION 1. Amendments to the Constitution and By-Laws of the Institute may be made only at the annual meetings thereof.

SEC. 2. Proposed amendments to or changes in the Constitution and By-Laws must be submitted to, and have the approval of, the Board of Control, and shall be circulated among the members entitled to vote at least two months before the date of the annual meeting. Each such member in good standing shall be furnished a ballot on which to record his vote, and no amendment to or change in the Constitution and By-Laws shall be made without the favorable vote of two-thirds of the members voting.

DEC 11 1924

SPECIAL NOTICE

Naval Institute Prize Essay, 1925

A prize of two hundred dollars, with a gold medal (or gold bar, if already a medalist) and a life membership in the Institute (or its commuted value, if already a life member), is offered by the Naval Institute for the best essay submitted on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1925.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1925.

6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the Naval Institute Proceedings as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

7. It is suggested that articles be limited to thirty (30) printed pages in the Proceedings of the Institute (about 13,000 words), but shorter or longer articles will receive equal consideration.

8. All essays must be typewritten, and should, if practicable, be submitted in duplicate.

By direction of the Board of Control.

H. G. S. WALLACE,
Commander, U. S. N., Secretary-Treasurer.